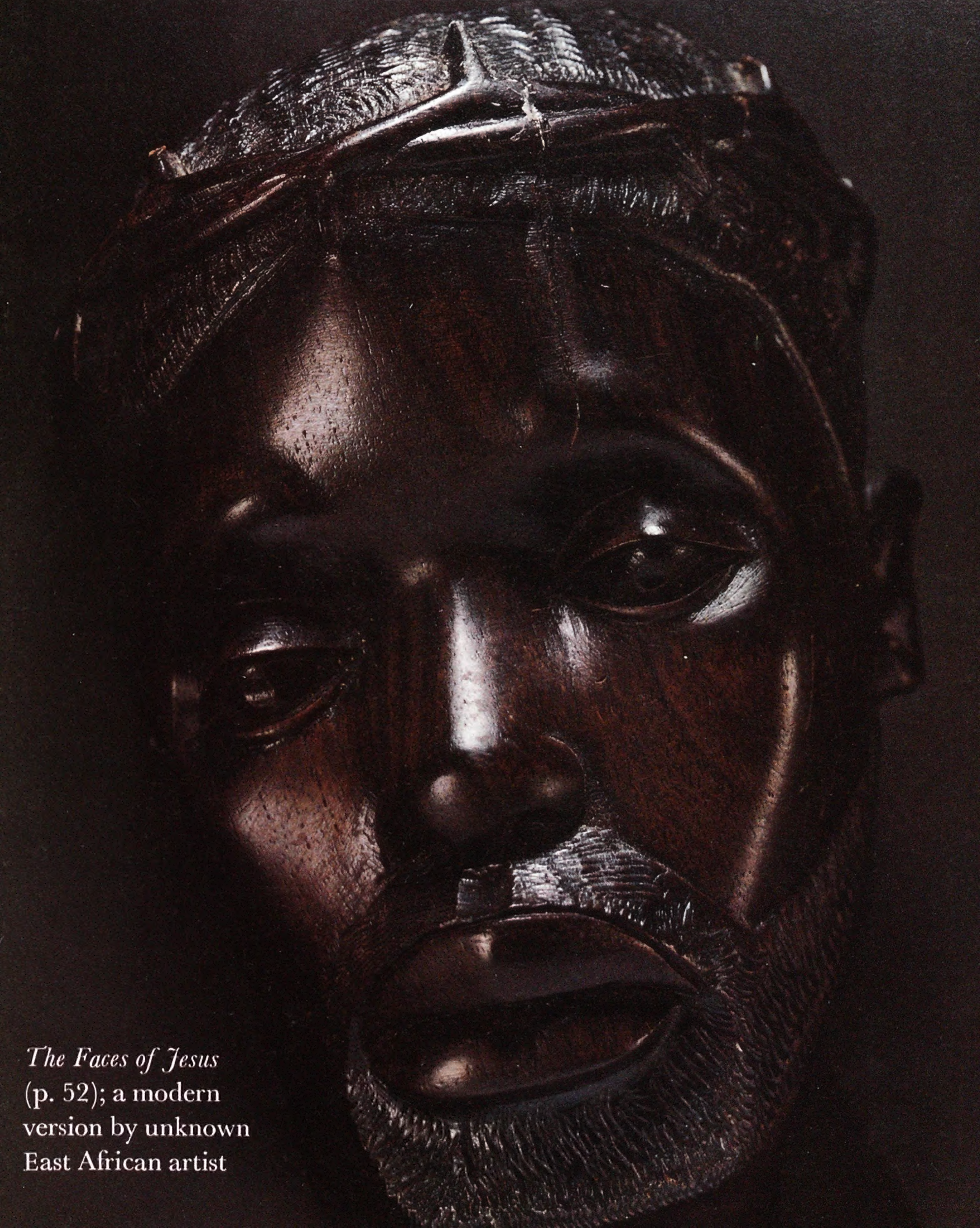
Smithsonian

November 1974



The Faces of Jesus (p. 52); a modern version by unknown East African artist

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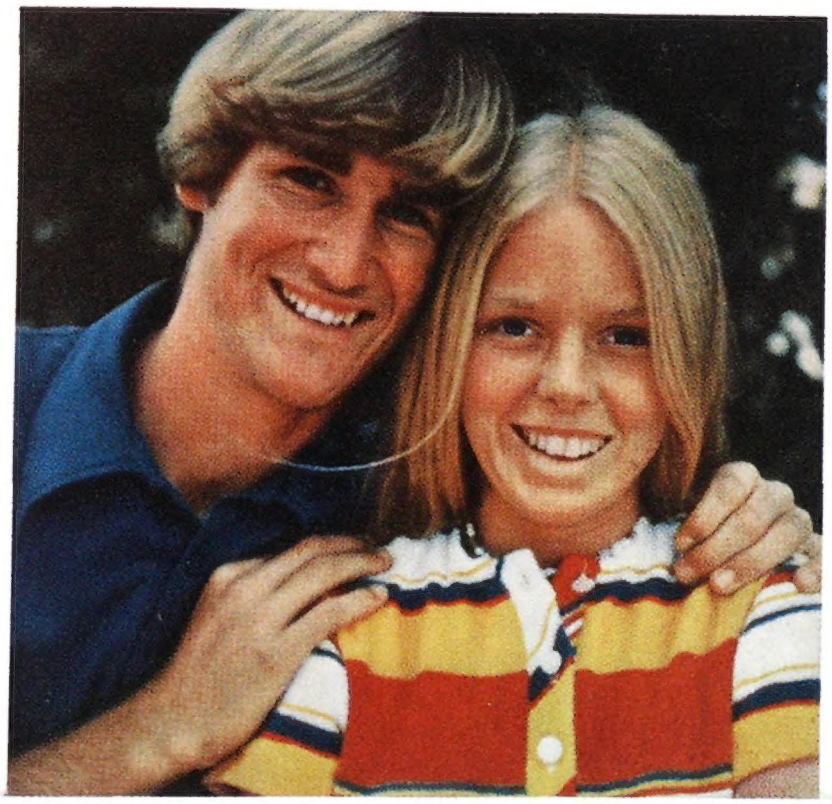

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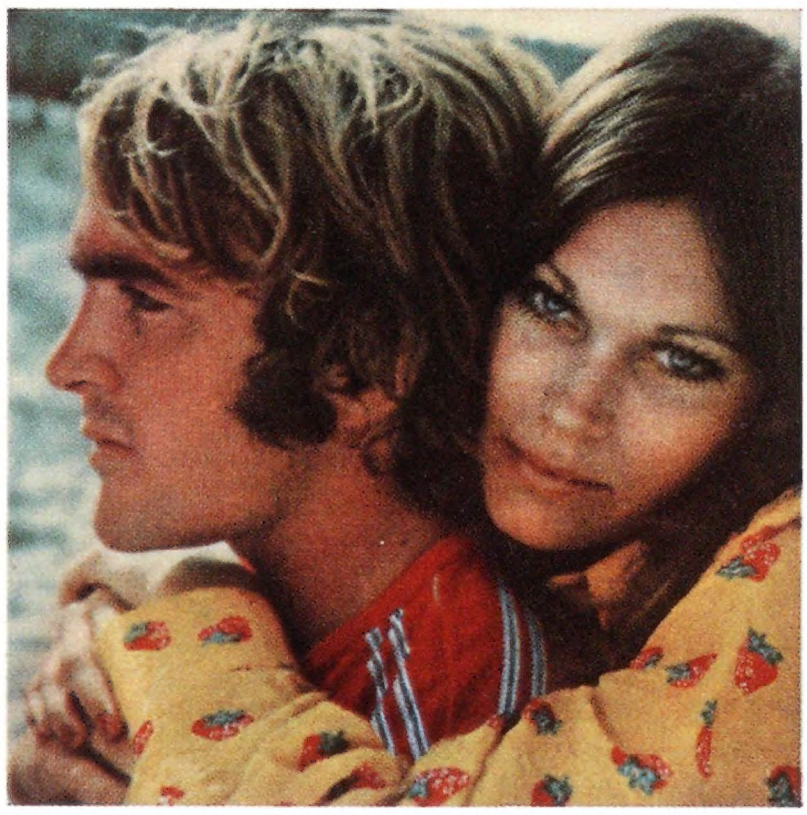

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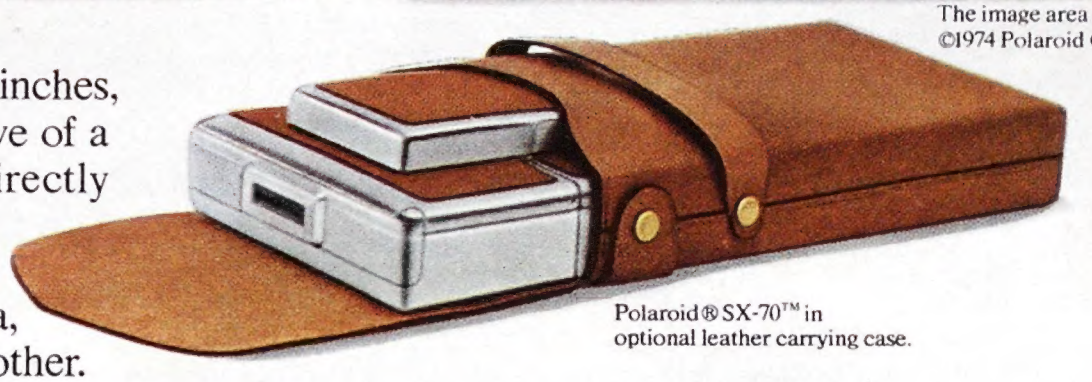

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Ballantine's

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The view from the castle

To pause by a New England pond, as autumn fades, leads to intimations of mortality and to pleasure in the limits to knowledge

The last of the scarlet swamp maple leaves have gone, but the glorious orange-yellow of the sugar maples still abounds. Reflected in our Litchfield, Connecticut, pond, the golds, browns and sumac reds seem to shimmer as the ducks wheel and turn. The ducks plow small furrows in the water as they maneuver. Everything is in suspense. We hold our breaths. What are we waiting for? A canvasback cocks his head sleepily, winking in the bright sunlight. I follow his gaze and see a red-tailed hawk wheeling high overhead. No matter—such birds represent no threat, unlike the goshawks and the crepuscular horned owls.

There is an air of total suspension in the New England autumn, as if to put off forever the sense of time. Surely we do not think of the death that follows autumn. This golden haze is temporarily immortal.

For more than 40 years I have come to sit on this bench at the turning of the seasons. Autumn is the most nostalgic of all—the rarest, when I was a boy, and the most sought after. I would be away at school when the male wood duck reassumed his brilliant greeny-purple iridescent crest lined with white, his creamy flanks and white-flecked mulberry-red breast. How does such a transformation come about? What hormonal changes are required for the drake to perform this miraculous feather molt? It was years before I found out at college—and, at the time, it was all new information. Now hormones are almost passé, oversimplified information, and biologists are peering with electron microscopes into intercellular space, charting chains of amino acid molecules strung on helical coils.

But naturalists who watch ducks or geese turning on the water and who patiently observe their ritualized, patterned lives are not the dilettantes of yore either. Two of them, Konrad Lorenz and Nikolaas Tinbergen, along with an insect-watcher, Karl von Frisch, shared the Nobel prize in medicine last year. For the first time, work in the field of observation—ethology, as it is called—gained full scientific recognition. What a change from the earlier days of this century, when naturalists were scorned as amateurs.

For myself, the reward is far more subjective and selfish. Amidst the hectic world of Man's busyness, amidst Man's overweening concern with Man, amidst his reckless spending of this planet's heritage, I can find surcease sitting on a wooden bench beside this pond. The busy world of ducks and geese, the changing seasons, the mood and patterns of dress and custom of the waterfowl tribe, serve as splendid reminders of our comparative place in the scheme of things.

In the suspense of such an autumn day, the lazy drone of bees hovering over the spoiled grapes is shot through with the taut call of the jay, the shrill "oo-eek" of the male wood duck. All at once, as if in drill, the ducks turn away, swimming for the opposite bank. What moved them? Radar? Sonar? Some parapsychic message? What a joy it is to realize that it is something we don't know. We cannot speak their language, any more than we can converse with whales. I hope we never can. I would rather keep such mysteries inviolate as reminders of the frailty of Man. I would rather savor this golden dream and sleep at the end, confident that I *will* know—later.

S. Dillon Ripley

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The amazing story

It was made in England in the eighteenth century and it cracked the very first time it was rung on these shores. Yet for soldier and citizen it has remained an enduring symbol of Liberty and Freedom in the new republic. Read on about the Liberty Bell and about a rather shrewd investment some twentieth century Americans are making in it.

In 1751, the Province of Pennsylvania had a policy of individual freedom that much influenced the other colonies. It was fitting that when the Assembly of the Province decided to order a bell, they asked that on the bell's shoulder be inscribed the biblical phrase from Leviticus XXV. 10 "Proclaim liberty throughout all the land unto all the inhabitants thereof." Thomas Lester's Whitechapel Foundry in London was chosen to cast the bell and in September 1752, it arrived in America. Philadelphians gathered in the State House yard to hear it ring out. It cracked, however, upon the first strike, perhaps due to mishandling by amateur colonial bell hangers, eager to hear it. In 400 years, it was to be the only bell from Whitechapel's to have so cracked. "Two ingenious workmen", John Pass and John Stow recast it, but Norris did not like its tone and had it recast a second time. It was then hung in the State House tower; and for the next twenty years, it would ring out on the burning issues of the day. It loudly proclaimed the coronation of George III but was muffled as it sadly tolled the "death of liberty" when the Stamp Act was enforced in 1765.

THE BIRTH OF A NATION

On June 1, 1774, the bell was again muffled and tolled in sympathy with the people of Boston on the closing of their port. Following receipt of tidings of the Battle of Lexington, April 25, 1775, the bell called together 8,000 people (by computation) who assembled in the State House yard and agreed, unanimously, "to associate for the purpose of defending with arms, our lives, liberty and property against all attempts to deprive us of them."

The supreme effort of the bell to proclaim liberty was next in order. The historic second session of the Continental Congress was already underway, and the final break with Great Britain only a matter of weeks, perhaps days. The resolution sponsored by Richard Henry Lee was presented June 7, 1776, declaring "that these United Colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British Crown and that all political connection between them and the State of Great Britain, is and ought to be totally dissolved;" In the interval, a special committee had been appointed to draft a formal statement. The Lee resolution was agreed to July 2, and the Declaration penned by Thomas Jefferson, after revision in the committee of the whole, adopted July 4. Then, on July 8, 1776, the bell rang to summon the patriots for the first public reading of the Declaration of Independence, which had been adopted four days earlier by the Continental Congress. The bell was now part of American history. The birth of an Independent Republic, the seed of a world power, was an accomplished fact. The old State House Bell, as it was then called, was now to "Proclaim liberty throughout all the land unto all the inhabitants thereof," to ring out independence, to have its sequel taken up in every town and hamlet, to set in motion a never-ceasing force against tyranny and oppression. When a British army threatened to occupy Philadelphia in 1777, the Bell was dramatically spirited away to nearby Allentown and hidden beneath the floor boards of the Zion Reform Church. After it was returned to Philadelphia in 1778 it pealed forth great news, ringing out loud and clear from Cornwallis' surrender in 1781 until it cracked again, permanently, in 1835. It has been cautiously rung many times since with a rubber mallet. In 1944, on D-Day, its muffled sound was broadcast over network radio.

IN COMMEMORATION

To commemorate the 200th anniversary of the Declaration of Independence in 1976, the famous Whitechapel Bell Foundry of London (the same bellmakers who cast the original Liberty Bell) is casting a limited number of Bicentennial Liberty Bells to the original design and on the original site. About 100 of the two thousand pound full-scale replicas are being cast, for delivery to communities throughout the Nation.

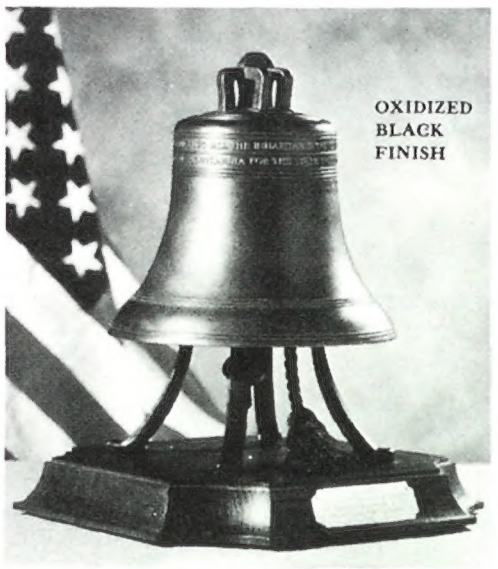
In addition to the 100 large bells Whitechapel is casting a Limited Edition of 2400 smaller 1/5 scale replicas utilizing a special process. Over 1200 of these bells have already been ordered and about 1000 of them have been delivered, thus far, to Americans throughout U.S.A.

This worthwhile project has been given the recognition, sanction and endorsement, of many organizations and official Government agencies. For instance, The Bicentennial Council of the Thirteen Original States, the non-profit organization comprised of state officials representing the Bicentennial Commissions of each of the thirteen original states, has designated the Whitechapel Bell Foundry as the "Official" bell-maker for America's Bicentennial. The administrators of Independence National Historic Park, where the original Liberty Bell is enshrined, (operated by the National Park Service, U.S. Department of Interior) have also pledged their full cooperation in support of this Official Bicentennial Liberty Bell Project.

Many veterans groups, patriotic organizations, service clubs, local chambers of commerce, etc., have already invested in the ownership of one of the limited number of the smaller replicas. They plan to use them during the Bicentennial period and then retain them for their collector value thereafter. The purchase price of the replica in the oxidized black finish (the same color as the 1752 bell) is $885. In polished bronze it is $945 . . . in .999 Silver plate it is $990 and in 22 karat gold plate it is $1390. These prices include duty, special crating, insurance and overseas shipment to the U.S.A.

Each 1/5 scale Liberty Bell replica weighs approximately 20 lbs. and stands 15½ inches high on a plynth of hand-carved Oak grown in Windsor Forest. A plate made from Old English sterling silver is mounted on the right hand side of the plynth, bearing the words "Cast by the Whitechapel Bell Foundry, London, to the Original Design of the Liberty Bell Cast by Them on the Same Site in the Year of Our Lord 1752". For the left hand side, a special hand-engraved matching silver plaque bearing the owners name and personal inscription can be ordered for $5.00 and 30¢ a letter for engraving.

The Bicentennial bells are exact in every particular to that cast in 1752 by Whitechapel's master founder, Thomas Lester, for the State House of Pennsylvania (now called Independence Hall). The Whitechapel Bell Foundry was founded in 1570 during the reign of Queen Elizabeth I. Many of its earliest bells are still in existence, including two bells at Westminster Abbey cast in 1583 and 1598. Among the recent bells from Whitechapel are those of Washington Cathedral, hung in 1964. The bells of Big Ben, which towers over the Houses of Parliament, were also cast at Whitechapel, as were the great bell of Bow in



London in 1750 and the bells of St. Clement's in 1588, the year of the Spanish Armada. Both are remembered in the old nursery rhyme, "Oranges and Lemons." The bell itself is made in the manner of the original Liberty Bell, embossed with the quotation from Leviticus XXV. 10 in type face used by the original bellfounder, Thomas Lester. The clapper, drawn into a hand grip with a tasseled cord, strikes the walls of the bell and causes it to ring a perfectly-tuned note at each stoke. Each bell has been meticulously tuned (actually five partial tones are tuned together) to its final and perfect pitch—E Flat—the same tone as the 1752 bell. The bell will have no crack! It will sing its song as magnificently as the original Liberty Bell did when Lester tested it before it left London. In this way, the ancient and historic contract between London and Philadelphia is fulfilled.

HOW TO MAKE A BELL

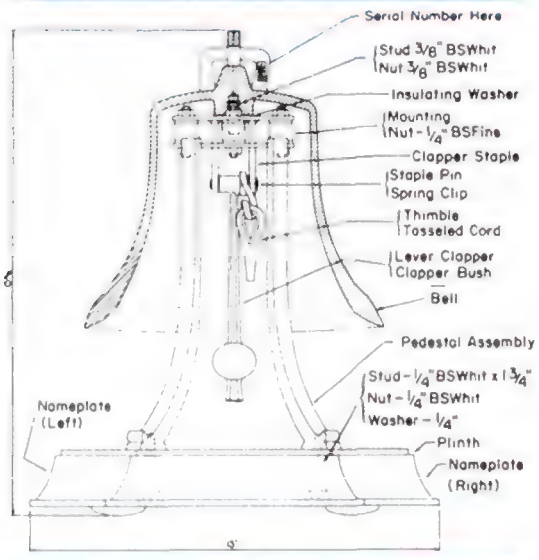
To make this reproduction possible, the Whitchapel Bell Foundry has incorporated and refined an ancient process which had not been used in bellmaking for over 600 years but has been used mainly to reproduce exact detail in fine metallic art work. This is the cire perdu or "lost wax" method of bellcasting, which was recorded most notably in the 12th century by the medieval monk Theophilus

of the Liberty Bell

advertisement

in his "De Diversis Artibus", but which was subsequently superseded by the "false bell" method. The principal advantage of the "lost wax" process—and an absolute essential in the making of the Bicentennial Liberty Bell—is the high quality of the resultant castings, particularly where intricate or decorative work is involved. The Liberty Bell has an inscription of 170 separate letters, and this inscription proved disappointing when cast normally at a scaled-down ratio of five to one. To overcome this, and to preserve the clarity of the lettering at reduced size, the Whitechapel Bell Foundry evolved, after two years' research, a process which involved fashioning the primary pattern of the bell not in traditional clay but in wax of medieval bellmakers.

In essence, the technique at the primary stages is not dissimilar to that described by Theophilus, although now considerably refined. In short, it involves making a complete bell in wax, and then investing, or coating, this in a ceramic material.



PERFECTION OR DOOM

This ceramic material builds up very slowly in outer shell of some ten coats thickness, using a combination of first aqueous colloidal silica and then calcined china clay. This process, carried out by hand with immense care, is critical to the whole and takes about a week. Any error in the application can result in an imperfection, in which all of their exacting work is for naught, for each finished bell must be *perfect* or it is destroyed and consigned to the kiln.

The invested bell is then placed in a de-waxing furnace, which melts the original pattern, leaving only the ceramic shell—now the master pattern. This is baked at high temperature and provides the final mould from which the actual bell is then cast with molten bell metal. When the metal has cooled and hardened, the ceramic pattern is smashed away, leaving a magnificent bronze bell.

The casting, and all subsequent stages —such as tuning, polishing, and assembly —are done by conventional methods, the result being a bell of the highest authenticity. The process allows the foundry to capture the original lettering of 1752—the precise form of the letters used by Thomas Lester was checked by reference to dozens of bells cast by him and still in use in steeples all over England.

MOUNTING

The mounting of the Bicentennial Liberty Bell has been carefully engineered and no detail has been spared to obtain absolute perfection. The bell is secured by a single center bolt inside its crown to a steel plate to which the jaws of the clapper staple are welded. The forged clapper swings between these jaws on a plated steel pin running in a nylon sleeve to ensure free silent action and perfect mechanical insulation. It is actuated by a silken tassel attached by a solid brass eyelet to a lever which is part of the clapper forging.

To provide the "give" necessary to insulate the bell and clapper together from the forged pedestal and oak base, and to enable it to absorb the occasional jolt in safety, the steel crown plate is connected to the pedestal through four special neoprene and rubber vibration mountings, which in turn are mounted on a steel ring which forms a common connection for the four "legs" of the pedestal. The lower ends, or feet, of these forgings are bolted through the oak plinth. In reducing a bell by scaling it down to one-fifth of its original size, the clapper must be reduced by the same scale to maintain the correct proportion; but while profiles can be scaled, "nature" cannot and the miniature clapper would not bring out the rich tone of the bell. This problem was overcome by introducing into the striking face of the clapper forging a "plug" made from a special type of nylon, which backed up by the weight of the clapper bell, ensures that the bell gives its full tonal resonance.

MADE TO ENDURE

Theophilus, writing on the intricacies of bell founding, stated "that the craft requires *not* indolent workmen, but keen dedicated men, for fear the bell be spoiled at some point in its manufacture." Whitechapel has ensured that nothing has been spared in the design and making of the Bicentennial Bells and their mountings and has fully maintained the ancient traditions of its craft. These bells have been made to *endure*. With proper care, there is no reason why they should not ring in the tercentary and quadricentary celebrations of these United States. Every bell is fully guaranteed—against any defect. And they are guaranteed *never* to crack!

Only 2,400 bells will be cast—each bell thus symbolically representing a separate month of independence. WHEN THE LIMITED EDITION IS COMPLETED, THE MASTER MOULD WILL BE DESTROYED. Only a limited number of Americans will ever have the privilege of owning one.

A PRUDENT INVESTMENT

Although the bells have been available but a relatively short time, more than 1200 have already been snapped up by collectors, businesses, universities, and private individuals. Indeed a bell, purchased from one of the earlier castings, would already bring almost 23 percent more in resale at the established price.

While there are no direct comparisons, it is interesting to chart the continuous growth in value of certain other limited editions during recent years. The Winston Churchill Commemorative Medal struck in London in 1965 increased in value by 80 percent within two years. Perhaps the record is held by a pair of Dorothy Doughty quail, issued by the Worcester Royal Porcelain Company in 1940 as part of a limited edition, which fetched about $50,000 in a spirited auction recently. To take a more ordinary example, a porcelain figure of Princess Elizabeth, part of a 1947 limited edition, sold for $280 each, is now valued at over $4,000.

GOOD TO GET – GOOD TO GIVE

Of the nearly nine hundred bells thus delivered, each has been received with absolute satisfaction. Historical Societies, Foundations, Businesses, Churches, Museums, even Government Agencies, have been, without exception, well pleased. So, too, have the most finicky of private collectors. A number of generous subscribers have ordered the bells for the purpose of donating them to Universities, Colleges, and Museums. Some subscribers order one for themselves (and their families) and another to donate. Such a gift will be long-remembered.

If you wish to commission the casting of a bell, we urge you to fill out the coupon below and send it at once, along with your deposit, to avoid disappointment. Since less than 1200 replicas remain and the total readership of SMITHSONIAN magazine is estimated to approach a million people, we must insist on the following terms: serial numbers will be assigned strictly on the basis of time of receipt, and we cannot guarantee early delivery of any order received after December 15, 1974

Each bell is fully and unconditionally guaranteed. They are not available in stores, nor will orders from stores be accepted.

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Phenomena, comment and notes

Preserve Los Angeles intact, the ongoing argument on ascorbic acid, and a tiger tale

REQUEST KIND PERMISSION SEND SEIDENSTICKER AND TRANQUILISER EQUIPMENT ONE WEEK CALCUTTA. . . . began an urgent cable sent on August 9 to the Smithsonian. And thus began a drama which unfolded itself to Smithsonian officials through a flurry of cables funneled through the State Department and, later, through news clips from a wide selection of Indian newspapers.

The man in question, John Seidensticker, is a rangy, private man, a zoologist who has spent years studying grizzlies and pumas. His specialty is the use of tranquilizing drugs shot in a capsule to immobilize his subject so that radio transmitters can be attached and the animal's movements and activities traced. He had just completed a stint in a pioneering study of the ecology and territoriality of Nepalese tigers by this method for the Smithsonian and the World Wildlife Fund (WWF). Seidensticker is very good at his specialty. Another cable that arrived at the Smithsonian Institution on August 10, from the WWF administrator for India, said: SEIDENSTICKER ALONE SUITABLE.

He was needed to immobilize a man-eating tiger that had become stranded on an island in the Sundarbans region of West Bengal. The tiger had killed an old woman and was terrorizing the villages on the island, killing cows and chickens.

The Smithsonian immediately granted approval, pointing out, however, that

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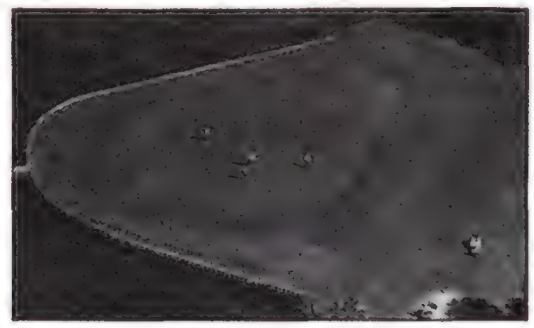
Seidensticker was technically no longer in its employ. There followed a veritable blizzard of cables back and forth, clearing up the myriad details of the mission. Word came from Katmandu that Smithsonian approval was needed before the Nepal tiger project could let the rifle and darts out of official hands. Approved. A cable arrived via the State Department from Calcutta: THE QUESTION OF WHO PAYS FOR THIS EXPEDITION OF MERCY . . . NOT DISCUSSED . . . [Signed] MOYNIHAN. The answer went back that if there was any problem, SMITHSONIAN WILL COVER. . . . [Signed] KISSINGER.

The zoologist arrived on August 13, his progress noted by more cables, and then there were several days of silence. On August 20 a cable was sent saying that

John Seidensticker attaches radio transmitter to Nepalese tiger.

Seidensticker had located the tiger, probably a small female, and that it would take time to dart it. Meanwhile, the tigress had been tried (in absentia) and found not to be a man-eater—a technical distinction of some importance since only man-*eating* tigers can now be killed in India. On August 25, a communist newspaper, still referring to the tiger as a man-eater, suggested that Seidensticker was a bogus hunter and broadly hinted that the presence of foreigners so near the Bangladesh border must have something to do with the smuggling of arms. Another paper reported that the Border Security Force had been alerted.

On August 27, another cable: The hunter had observed the animal at 40 feet as it killed some bait, but darting at night was dangerous (because the drugged tiger



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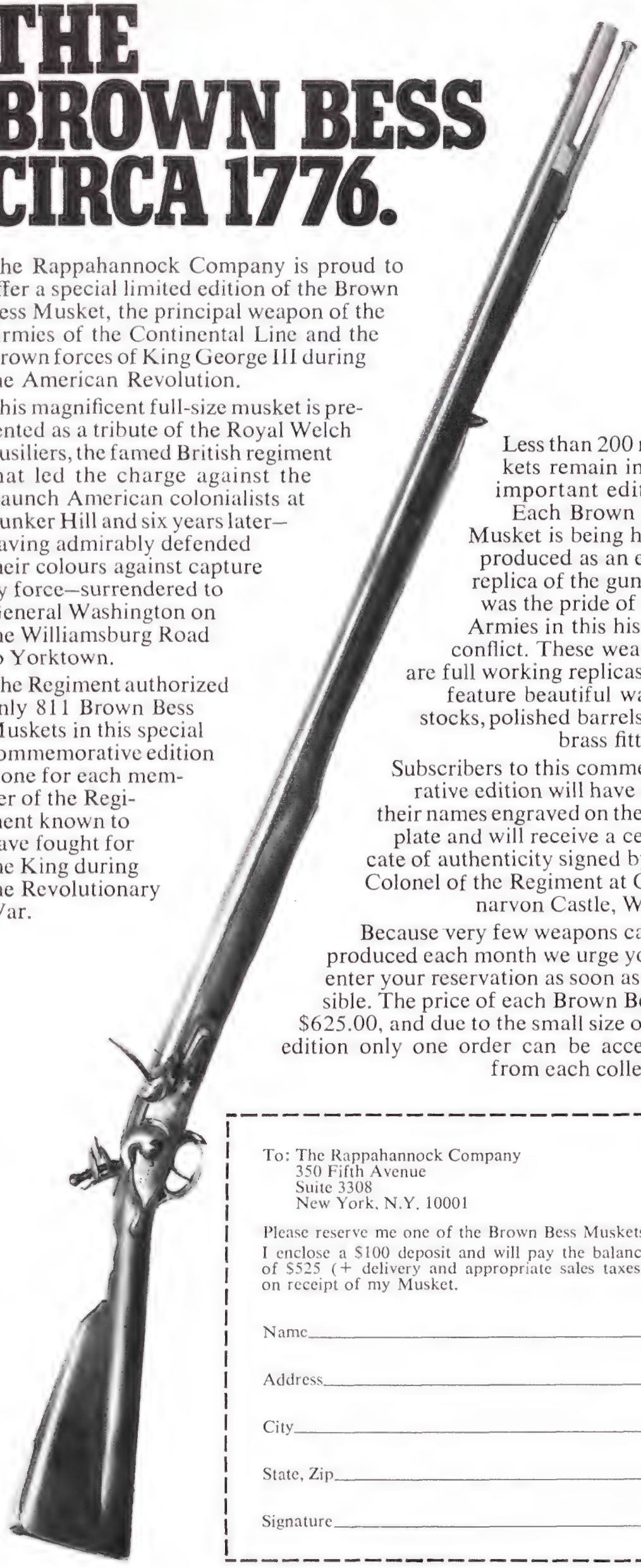

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might stagger off in the dark and drown itself before the hunter could get to it). Nevertheless, the cable said, Seidensticker would take the risk. The same day another cable arrived: TIGER DARTED AND MOVED TO CORE AREA SUNDARBAN TIGER RESERVE ON 26 AUGUST. It turned out the "tigress" was a very young male, and it was judged to be in good health by an Indian veterinarian before its release.

Indian newspapers were full of accounts of this triumph. The quiet-spoken Seidensticker was a hero. It was a great moment for U.S.-Indian relations.

But then, on September 3, a report appeared in the Indian press that the tiger had been seen, apparently paralyzed, lying near its crate; Seidensticker and Indian officials were frantically searching for it. The next day the report came that they had found it—dead. It had been severely lacerated and the carcass was surrounded by the pug marks of a large male. Overdose, shrieked the communist press. The unfortunate result of a territorial fight during the mating season, explained the emotionally drained scientist, who had been unaware of the presence of another tiger in the immediate vicinity when the young male had been released. Nonsense, said one Indian expert; tigers aren't territorial.

The debate goes on. Smithsonian officials point out that, at any rate, it was the first successful immobilization of a wild Indian tiger and if it's true, they add skeptically, that tigers are *not* territorial, then we have smoked out the major ethological fact of the decade.

More on vitamin C

Vitamin C continues to provoke controversy but, happily, it is also provoking a good deal of study, so one may perhaps expect some firm answers before too long. For now there seem to be only claims and counterclaims.

A Canadian study suggests that taking from a quarter of a gram to two grams a day every day, as a kind of preventive against winter illnesses, doesn't do very much for you. But the Canadians found that once you get a cold, a huge dose (from four to eight grams a day for the first day of illness) will significantly reduce the duration of infection.

These findings are at variance with an earlier study, conducted with Navajo

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Other

Once again, the overwhelming majority of piano soloists scheduled to perform with the following orchestras during the 1974-75 concert season, have chosen to play the Steinway.

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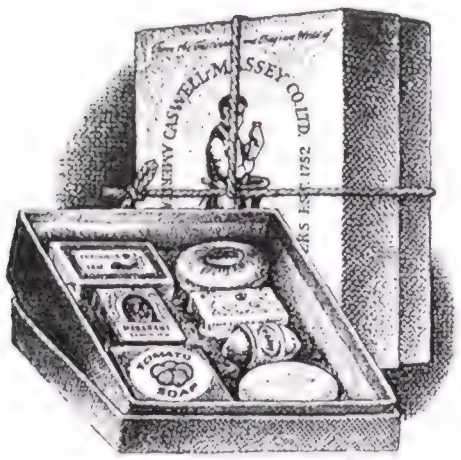

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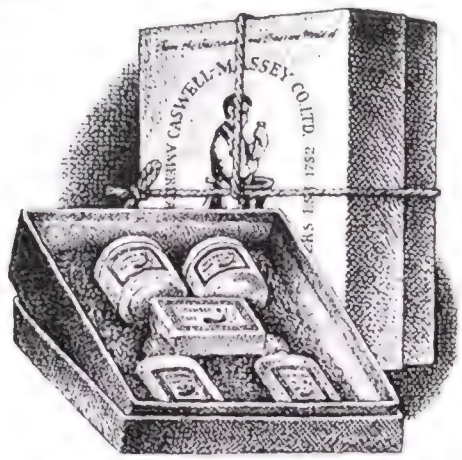

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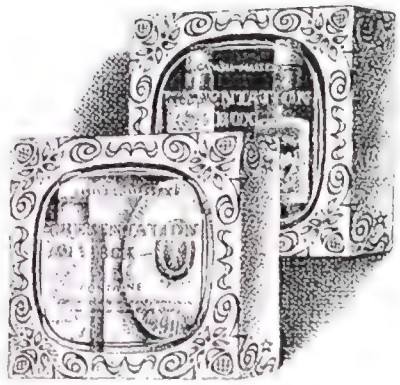

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children, which indicated that sizable daily doses did have a prophylactic effect, but this may be because the Navajo children were already severely deficient in vitamin C.

According to *Medical World News*, the Canadian researchers believe that sudden withdrawal from massive daily doses "could be a more serious potential side effect than could kidney acidity." After discontinuation, they found, blood levels of ascorbic acid drop precipitously below pretreatment levels.

Research elsewhere indicates other side effects. Vitamin C seems to counteract the effects of anticoagulant drugs, for example, and there is a danger that pregnant women taking massive doses will create a vitamin C-dependency syndrome in their children. With these problems in mind, the National Academy of Sciences recommends 45 milligrams a day while the Food and Drug Administration calls for 60 to 90 milligrams.

Meanwhile, a British doctor named Constance Spittle has produced some evidence that vitamin C serves to mobilize cholesterol from the arteries and hasten its transport to the liver where it breaks down into bile acids. Furthermore, she says, vitamin C promotes tissue repair, and it may be that cholesterol starts building up on arterial walls that are damaged. Tests in her hospital also indicate that the vitamin serves to reduce postoperative thromboses formed when a blood clot gets caught on the imperfect wall of a vein.

As for Dr. Spittle, she takes one-half a gram (500 milligrams) each day and eats lots of fresh vegetables and fruit.

Preserve Los Angeles

Congress is considering legislation that would extend the deadlines of the Clean Air Act so that cities will not suffer severe economic dislocations by trying to launder their atmosphere. The area that provided the greatest impetus to this new legislation is, of course, Los Angeles, probably the most automobile-dependent place in the world.

Rather than tamper with existing laws, however, a Wisconsin Earth scientist, Henry S. Cole, suggests in *The Bulletin of the Atomic Scientists* that a brand new law be passed. It would be called the National Environmental Degradation Act (NEDA) and it would set aside the Los

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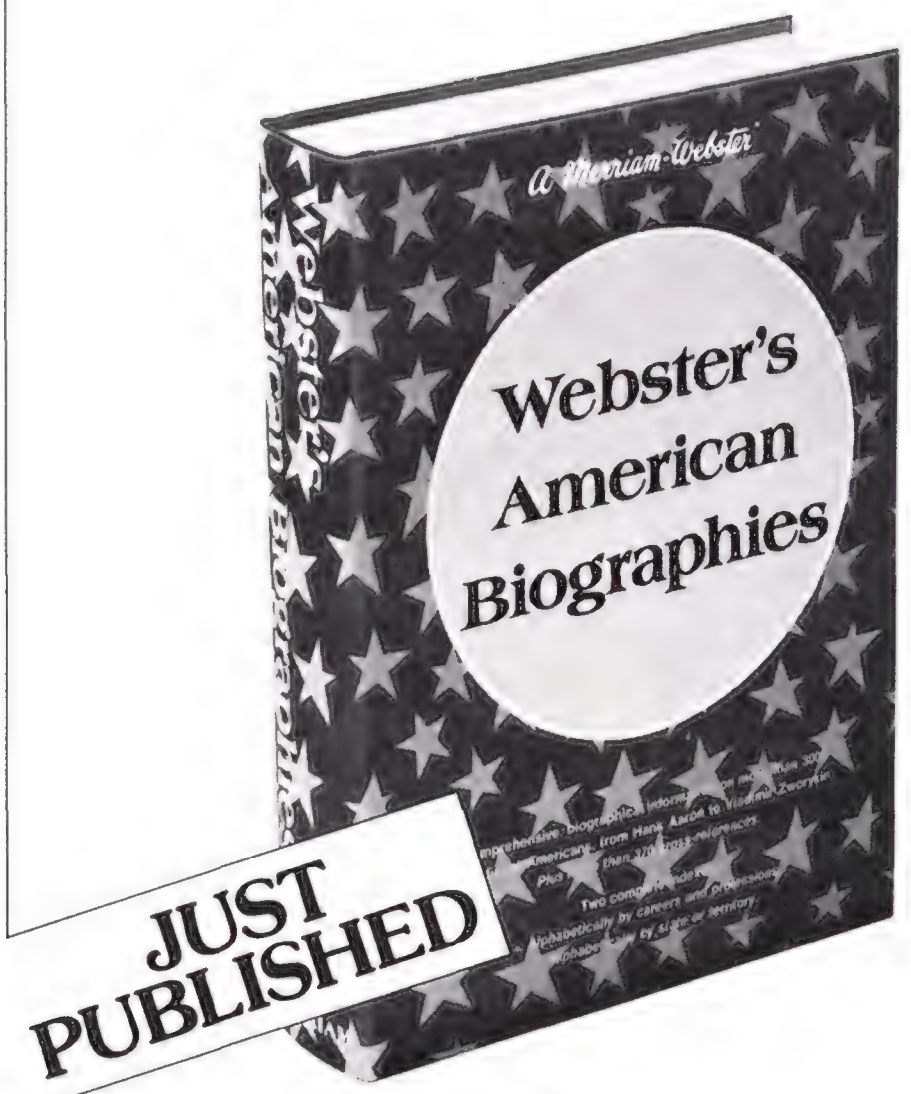

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Angeles Basin as a federally supervised "degradation preserve."

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Not only would this hasten the economic development of the area, says Cole, but "the Los Angeles Basin Preserve could become the national learn-by-doing testing ground for nuclear development." Given the large number of nuclear plants that should quickly mushroom in Los Angeles, the possibility of accident would increase greatly but, Cole points out, the characteristic atmospheric inversions of the area, which tend to keep smog overhead, would also tend to contain any radioactive materials resulting from such accidents. Any nearby cities that proved antagonistic to the idea of the preserve would either be relocated in Nevada or "be enclosed in gigantic [plastic] domes." San Bernardino might elect to become "San Bernardomo."

The Cole proposal, says its proposer, would allow Los Angelenos to escape the "blight" of environmental regulation, give ecofreaks the "permanent living example of environmental doom" they seek, and provide all the rest of us mass-transitized, solar-heated and -cooled citizens with an interesting and nostalgic tourist attraction.

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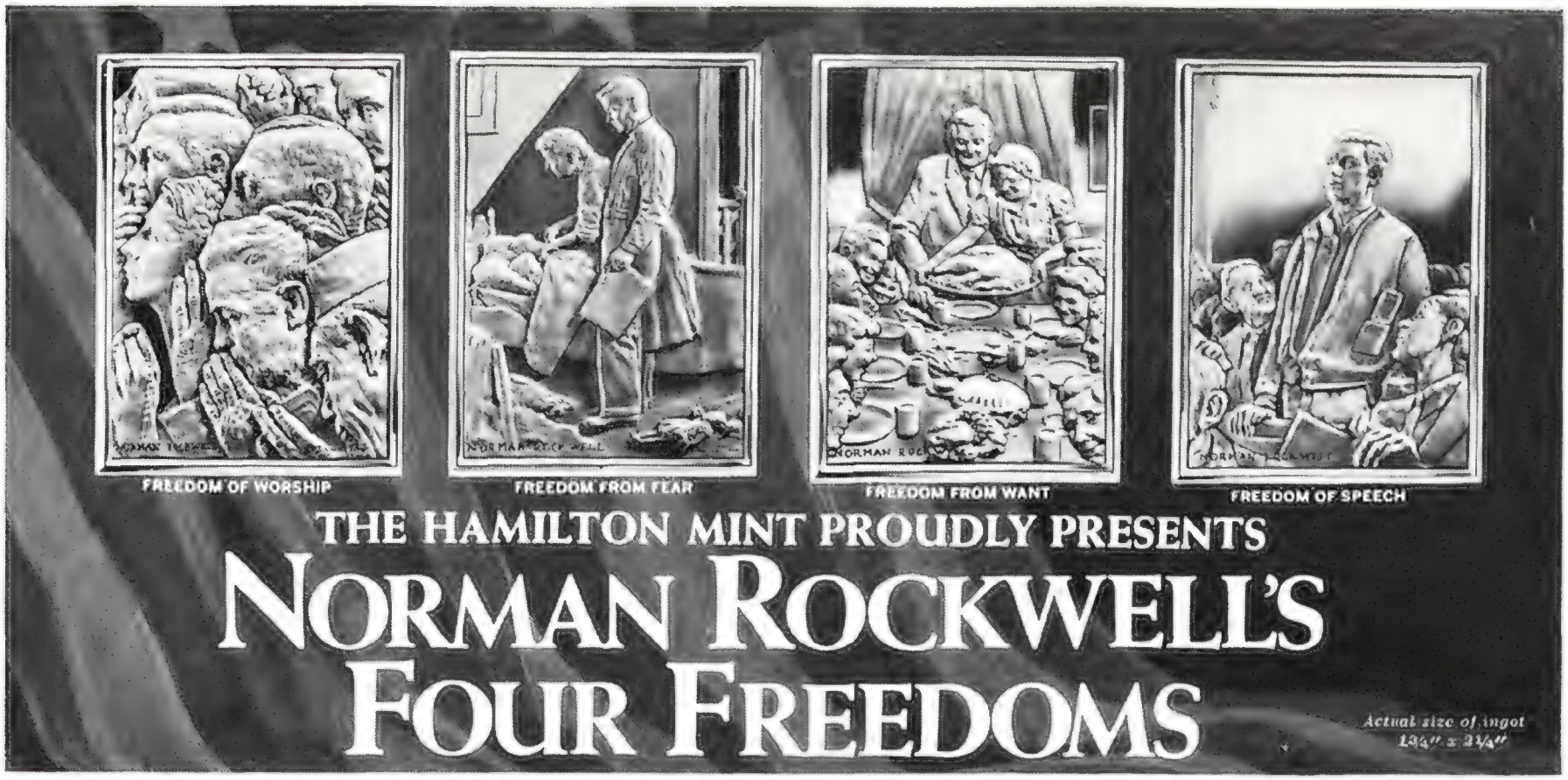

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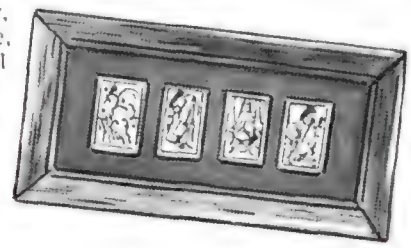

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In Washington, D.C., the people said "Go!" in endorsing the $3-billion "Metro" rapid rail system. When completed in 1980, the "Metro" will have 98 miles of rail and 86 stations. It will annually serve an estimated 350 million commuters from District of Columbia, Maryland and Virginia suburbs. So far, more than 100,000 tons of Bethlehem construction steel products have gone into the project.

Also in Washington, D.C., the middle vehicular bridge of the three that cross the Potomac at 14th St. has been temporarily designated "for buses only" to help speed rush-hour traffic from Virginia into and out of the city. Traffic is one-way north in the morning and one-way south in the evening. Bethlehem fabricated and erected the steelwork for this bridge.

In Houston, the country's third largest port, there's a new bridge over the Houston Ship Channel. It's the final link in a highway loop, Interstate Highway 610, that skirts downtown Houston and directs traffic away from city streets. The largest bridge ever built in Texas, its 10 traffic lanes will handle a projected 120,000 vehicles a day by 1980. Bethlehem supplied some 6,700 tons of structural steel shapes and plates.

In Manchester, N.H., they've eased the parking problem in the revitalized downtown area with this attractive parking facility. The four-level structure is connected to an adjacent shoppers mall by a pedestrian bridge, and can accommodate 410 cars. The garage is framed with Bethlehem high-strength steel shapes.

In San Francisco, the 71-mile, 34-station Bay Area Rapid Transit system (BART) is now in service. The final, 4-mile underwater linkup between San Francisco and Oakland was made in September. BART expects 160,000 patrons a day to travel on its fully automated, 80-mile-an-hour electric trains. Many Bethlehem Steel products were used in the construction of this system.

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We are so certain of this, that we guarantee you and your child will be pleased. If not, simply put all the surprise presents back in the box, and send it back to us—all of your money will be refunded.

Just tell me where to send the Christmas Box. Send me your card to go inside, if you want, I'll see it gets in the box.

Be the hit of their Christmas. Order today. **You must act immediately to insure delivery by Christmas.**

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Add $1.00 postage and handling for each $5.98 box, and $1.50 for each $10.98 box.

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or charge my ☐ Master Charge ☐ BankAmericard ☐ American Express

Card Number_____

Expiration Date_____

Master Charge Bank #_____

Signature_____

Name_____

Address_____

City_____ Apt._____

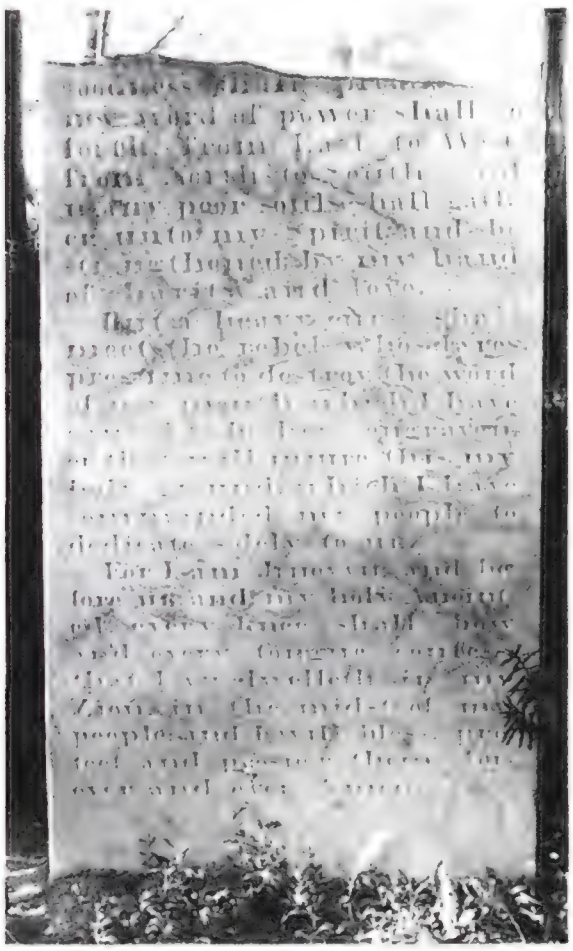
State_____ Zip_____

DIVISION OF BEVIS INDUSTRIES, INC.

Letters to the Editor

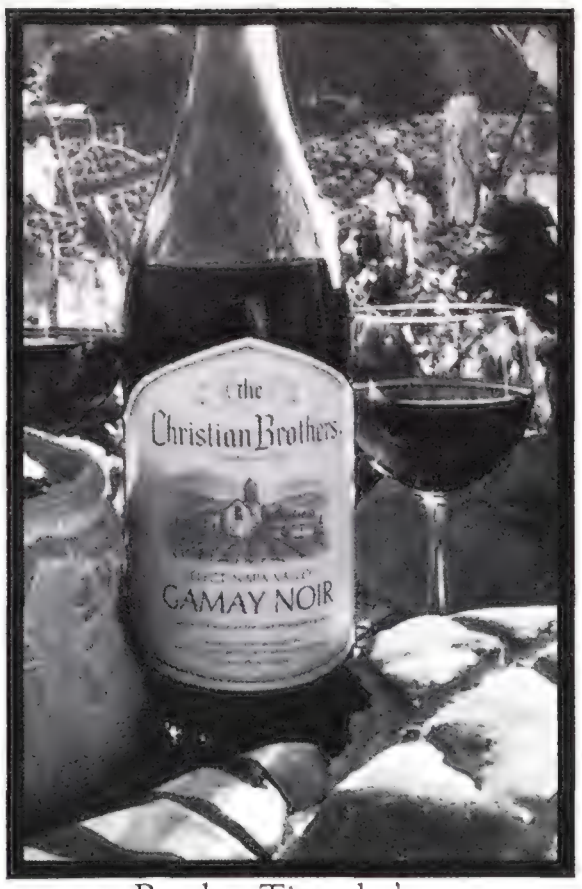
The Shakers

Dear Sir: I thoroughly enjoyed your article on the Shaker bicentennial year and feel that it is an excellent exposition of the Shaker way of life. However, there is a confusion about the Fountain Stones belonging to the museum at Old Chatham [see below].



Fragmented Canterbury stone

The stone we have outside the museum in the courtyard does have its top broken off, and the fragment has never been found. We think we have lost 9 lines and 14 inches. It came from Canterbury, and



Brother Timothy's
Napa Valley Notebook

Napa Valley Gamay Noir

Our red varietal Gamay Noir is made from the grape sometimes called "Gamay Noir a Jus Blanc" in the Beaujolais area of France.

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We make certain Gamay Noir does not leave our cellars till it is ready to drink, but as with our other premium red wines, it will continue to improve in your own "cellar" for another three or four years. Store on its side in a cool, darkened area.

Brother Timothy F.S.C.

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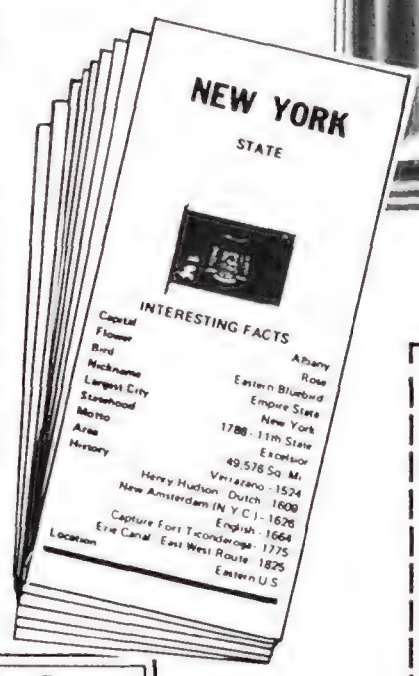

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	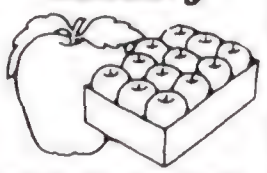	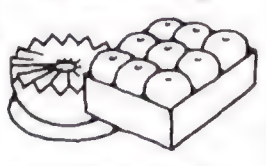	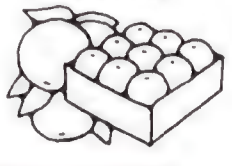
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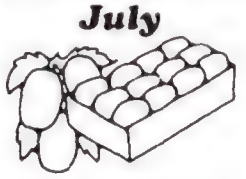
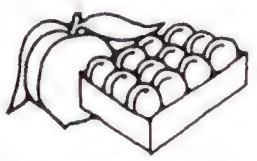
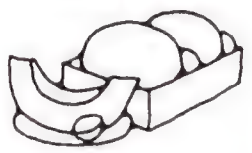
			
HAWAIIAN PINEAPPLES Two hulapaloozers. Fully ripened the way mainlanders hardly ever taste 'em. Net weight 9 lbs.	WILD 'N RARE® PRESERVES Old-fashioned pure fruit preserves — no preservatives added. Four ¾-lb tins. Net weight 3 lbs.	HOME-CANNED FRUIT Uncanny! Orchard fresh, in extra-heavy syrup. Baked Pears, Summer Delight Pears and Oregold Peaches. No. 2½ cans. Net wt. 5½ lbs.	GIANT KIWI BERRIES Amazing NEW fruit from New Zealand. Sorta watermelon strawberry flavor Net weight 2½ lbs
August	**September**	**October**	**November**
			
EXOTIC NECTARINES Plum peachy. Big and blushing. A sure-fire summer sensation. Net weight 5 lbs.	OREGOLD® PEACHES Family and friends'll never forget these huge Oregon beauties. Net weight 6 lbs.	ALPHONSE LAVALLE GRAPES Big, velvety-black Belgian hothouse type. Used to grow only for Royalty. Net weight 4 lbs.	SPANISH MELONS From Valencia in sunny Spain. Exotic and juicy with the limes we include Net weight 6¼ lbs.

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is under a little wooden pent-roof—not between two granite gateposts.

Our glass-encased Fountain Stone came from Groveland, New York, though it was "engraven" at New Lebanon and hauled to Groveland. It is indeed the only known complete one, and one of only two currently in visible existence.

The processions to the Holy Hills were not made at night; they were only diurnal, as far as we know. The Shakers needed their sleep, as they rose at 4:30 or 5:30 A.M., depending on the season, and were abed by 9 P.M.

Robert F. W. Meader, Director
The Shaker Museum Foundation
Old Chatham, New York

Dear Sir: In your article, you state that "There have been many celibate sects and orders—but none except the Shakers ever combined heterosexual virginity with propinquity."

It reminds me of a strange sect my husband and I met in 1928 when he was teaching in the West African country now called Ghana.

We visited the village of Anum, near the border of Togoland, which had been a German colony. The people had been converted by German missionaries. Their religion not only forbade marriage or sexual intercourse but also the wearing of clothes. The women wore a narrow strip of beaten bark, but the men wore nothing at all.

A very courteous old man showed us a pillar in the center of the village, inside of which was a brightly colored picture of Adam and Eve. "This be your grandfather?" he asked. Not wishing to get into a discussion about evolution, we said yes. "He no put cloth—why you put cloth?" Then he opened a Bible to the passage that says in heaven there is no marriage, and he looked at us reproachfully and said, "Why you do this thing?"

I remember that most of the people looked to be middle-aged, but there were a few children. Perhaps, like the Shakers, they adopted the children.

Freda Newton Bunner
Owen Sound, Ontario, Canada

They were known as Adagya Kuw, *the Nudist Society. Few, if any, remain alive today.* Ed.

Dear Sir: Thank you for your delightful cover. Anyone could have had the subject properly dressed and playing the piano,

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from the four corners imports

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FROM THE INDOOR WORLD® OF Armstrong

but only an artist could have thought to photograph the dear lady singing.
Catherine S. Stone
Washington, D.C.

Foxhunting

Dear Sir: I protest the oversimplified historical reference to Louis XVI in the article on Irish foxhunting in the September issue. Any student of French history would affirm that Louis XVI was obese, perhaps not the brightest of rulers, and had a decided passion for the hunt, but the events leading up to his decapitation were immensely complex. Your statement that he "put in ten-hour days on horseback . . . to the detriment of his rule (he ended up on the guillotine)" seems to imply unfair cause and effect.

The queen is simply described as "the lovely young Marie Antoinette," and there is no mention that she probably played a major role in leading the pair to the guillotine with her frivolous pastimes.
Christine B. Casner
Washington, D.C.

Dear Sir: Your article on Irish foxhunting was beautifully illustrated, but I doubt this statement: "Henhouses are now infrequent dining-out spots." Last summer, I spent five weeks in Ireland in rural Wexford County and couldn't get fresh eggs because the foxes had wiped out most of the neighboring hens.
Mrs. B. F. Nicholls
Coronado, California
Those Wexford foxes must have run out of field mice and rabbits. Ed.

Jupiter

Dear Sir: Since Jupiter's magnetic poles are 15 degrees from its axis of rotation, the outer magnetic field lines nod up and down like a flow meter. Wouldn't Jupiter's 9-hour 55-minute period of rotation produce five-hour peaks in radiation intensity instead of ten-hour peaks?
William J. Bauer
Houston, Texas
A spacecraft approaching Jupiter precisely in the plane of its equator would indeed experience a peak every five hours. One approaching anywhere else between 15 degrees north or south would experience two every ten hours, but not necessarily five hours apart. One approaching from outside the 30-degree

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cone, but fairly close to it, would experience a peak every ten hours, when the disk made its closest approach. The spacecraft Pioneer 10 approached from the south, outside the 30-degree cone. Ed.

London Library

Dear Sir: In your article on the London Library, you mention the manuscript of *A Passage to India* as E. M. Forster's "autographed" manuscript. Actually, it should have read "autograph" manuscript, meaning that the work was entirely in his own hand.
Herman W. Liebert
New Haven, Connecticut

Bhutan

Dear Sir: In the article, "Bhutan's king takes over . . . ," you mention a "jeepable" road. The word "Jeep" is copyrighted by American Motors Corporation and the J must be capitalized in whatever form the word is used.
William Sanders
Editor, *Four Wheeler*
North Hollywood, California

Early bird catches wrong train

Dear Sir: Patrick Ryan's July article, mentioning that an Oldham citizen's ashes arrived too late for the burial, reminded me of a similar situation that occurred in my family.

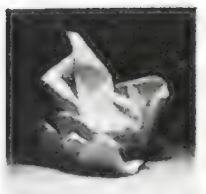
My late father-in-law, the Dean of the Diocese of Nassau and the Bahamas, died in Toronto and was cremated. The ashes were shipped air parcel post to Nassau for burial.

At the beginning of the service, the Bishop realized that the Dean hadn't arrived. A call was made to the postal department at the airport, where it was learned the package had been delayed at Montreal but that it was en route.

The first part of the burial and memorial services are the same. Accordingly, it was decided to begin the burial service and, if the ashes did not arrive in time, to shift into the memorial service. At the crucial moment, a postal employee arrived and the burial service continued.

The irony was that during his lifetime he had been the most punctual of men.
Fr. G. S. Burchill
Headmaster, St. John's Parish Day School
Tampa, Florida

Bergstrom vitalizes paper.



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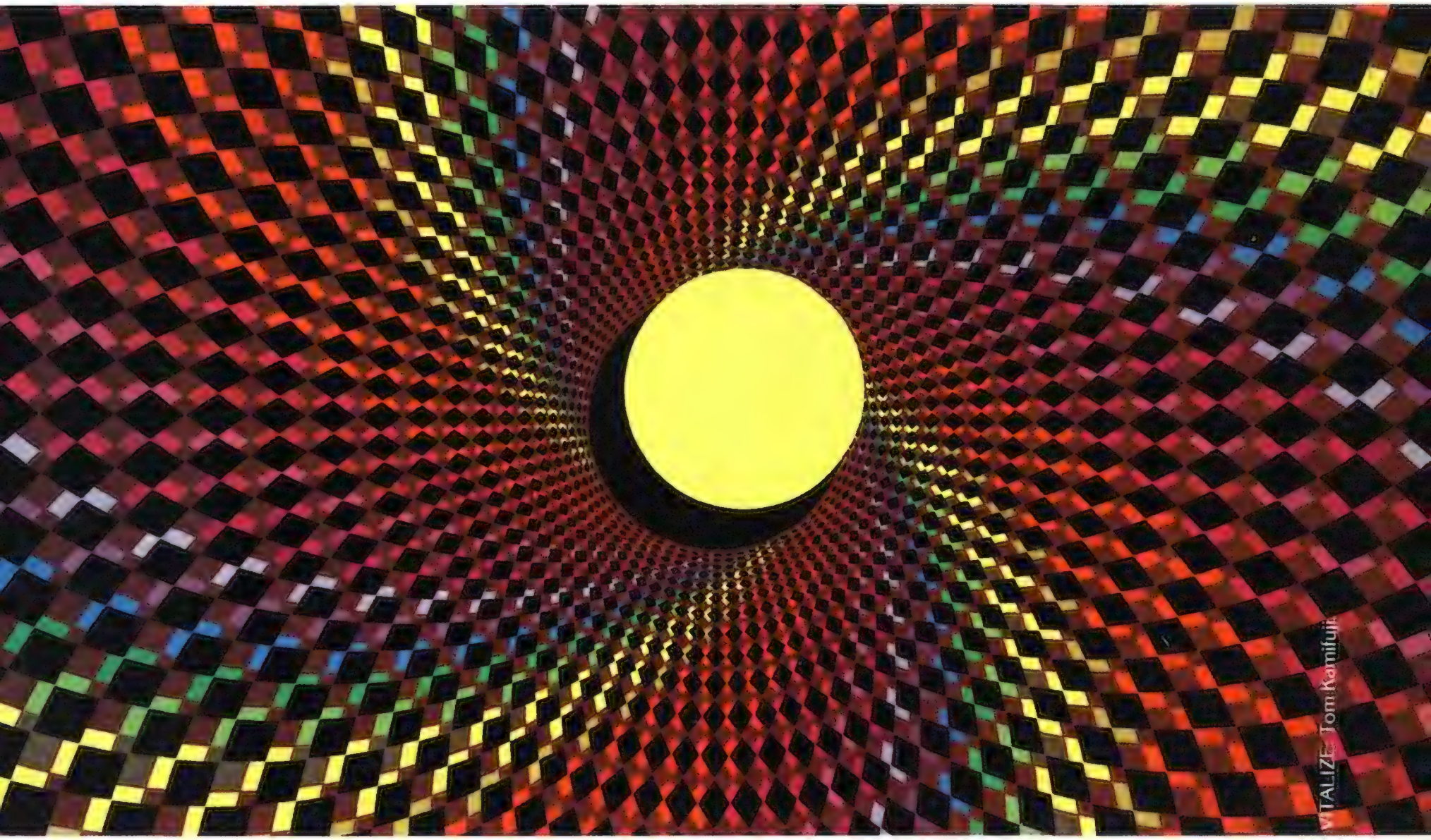

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This historic issue will mark the beginning of the first series of international medallic first day covers honoring important people, places and events throughout the world.

Significant Postal Issues

Each month, from among the scores of stamps issued around the world, a single stamp will be selected by the Society as the most outstanding on the basis of subject matter, design and collector interest.

At the time the stamp is selected, the Society will also honor the person, place or event depicted on that stamp by authorizing the creation of a distinctive commemorative medal minted in solid sterling silver. The medals will be minted by The Franklin Mint, the world's largest private mint, renowned for the beauty and artistry of its commemorative medals. Each medal will measure 39mm (1½″) in diameter, and will be struck with a flawless gem Proof finish—the design finely sculptured and frosted against a polished, mirror-like background.

Both the stamp and the medal will be combined in a special commemorative cover—and the cover will be individually postmarked on the *first day of issue* of the stamp, at the Post Office of first issue, in the city and country of origin.

These international medallic covers will be issued to advance subscribers in strictly limited edition, and will be personalized with the individual subscriber's name and address, if desired. The total edition of each medallic first day cover will be strictly limited to the exact number of advance subscribers. No additional covers will be produced for future sale and back issues will not be available.

The covers are certain to have major collector interest, for these reasons:

1. They will bear the world's most important and outstanding new stamps.
2. They will contain solid sterling silver medals of original design and highest proof quality.
3. They will bear distinctive first day postmarks from around the world.
4. They will be issued in a strictly limited edition.

Significantly, those who enter Charter Subscriptions will be the only collectors who have the opportunity to build a *complete collection* of these historic first day covers—from the very beginning.

How to Become a Charter Subscriber

The International Society of Postmasters has announced that Charter Subscriptions will be accepted for the three-year period beginning in January 1975, and that Charter Subscribers in the United States will be *guaranteed* the original issue price of $19.50 for each medallic first day cover *throughout the three-year subscription period*. This is a most significant guarantee in view of recent dramatic rises in the price of silver and the likelihood of further increases in the years ahead.

Each Charter Subscriber will also receive a deluxe album to protect and display the medallic first day covers together with their accompanying reference guides. The cost of the album is included in the price of the covers.

Each Charter Subscriber will have the right to discontinue his subscription at any time upon 30 days notice. However, it should be noted that once a Charter Subscription is discontinued, the exclusive opportunity to build a *complete collection* of these important international covers will be lost forever.

Subscription Deadline: November 15, 1974

Charter Subscriptions from collectors in the United States should be mailed by November 15, 1974, directly to the official minter, The Franklin Mint, Franklin Center, Pennsylvania, which will strike the medals and service all subscriptions in this country. Subscriptions in other parts of the world will be serviced by the international affiliates of The Franklin Mint.

This is *the only time* that a Charter Subscription for this collection can be accepted by The Franklin Mint. Only those applications which are postmarked by November 15, 1974 will be eligible for acceptance. Any application bearing a later postmark must be refused and returned.

CHARTER SUBSCRIPTION APPLICATION

International Society of Postmasters Medallic First Day Covers

Valid only if postmarked by November 15, 1974

Limit: One Subscription per Person

Mail to: The Franklin Mint
Franklin Center, Pennsylvania 19091

Please enroll me as a Charter Subscriber for the first series of International Society of Postmasters Medallic First Day Covers, consisting of 36 issues to be sent at the rate of one per month.

☐ I enclose my check or money order, payable to The Franklin Mint, in the amount of $19.50 (plus my state sales tax) to cover the cost of the first issue for 1975. I agree to pay the same amount for each subsequent issue, in advance, on a monthly basis. I understand that I may discontinue my subscription at any time upon 30 days notice.

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Mrs.
Miss_____
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Address_____

City, State, Zip_____

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All applications are subject to acceptance.

If you wish your covers personalized differently from your name and address as shown above, please print the personalization you wish, clearly in block letters, on a separate piece of paper and enclose with this application form.

☐ Check here if you wish no personalization at all.

31-86

THE INTERNATIONAL SOCIETY OF POSTMASTERS

GENEVA, SWITZERLAND

The International Society of Postmasters, which maintains its headquarters in Geneva, Switzerland, is a world-wide organization whose membership includes postmasters from 120 different nations of the world. The purposes of the Society include the development of an international spirit of fraternalism among postmasters, the fostering of high professional and ethical standards, the encouragement of a free exchange of ideas, and the stimulation of a public awareness of the achievements and contributions of postmasters throughout the world.

As part of its program of public information and education, the Society has established a new medallic first day cover service.

In consultation with philatelic and numismatic experts, the Society will honor the outstanding new stamps of the world on its international first day covers, and will commission the minting of proof-quality sterling silver commemorative medals honoring the subjects of these stamps.

For its first issue, on January 15, 1975, the Society will honor West Germany's commemoration of the centennial of the birth of the great humanitarian Dr. Albert Schweitzer.

Other subjects presently under consideration by world Postal Administrations for commemoration during 1975 include the 500th anniversary of the birth of Michelangelo; the joint U.S./ Soviet space launch; the 50th year of the reign of the Emperor of Japan; the 700th anniversary of the settlement of Amsterdam; the international observance of Universal Children's Day. Stamps which may be issued commemorating these significant subjects will be candidates for the Society's medallic first day covers. Final selection, however, will be made 60 to 90 days prior to issue, when actual designs and issue dates are customarily determined by issuing Postal Administrations.

200 years ago this month

Soldiering on the green is becoming more serious

NOVEMBER 1774

Grass is dying on scores of village greens, especially in the northern Colonies. Frosty fall nights stiffen it, and the frequent scuffing of farm boots in awkward parade quickens its death. For militia mustering days—"the discipline," as they are sometimes called—have lately been increasing in number and intensity.

For as long as any Colonist can remember, the able-bodied young men of every community have been meeting on occasion for a little military drill and a good deal of socializing. Villages produce companies, which in turn make up various Colonial regiments. And these make up a fighting force of sorts, designed to supplement the red-coated Regulars in time of war. The British call them Provincials, and it is fashionable to further describe them as rustic poltroons and to smirk at their inexpertness at keeping in step and making facing movements.

The militiamen don't mind being

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CAN A BETTER CAMERA MAKE YOU A BETTER PHOTOGRAPHER?

No one can deny that a fine photograph begins in the mind and the eye of the photographer.

But if your camera can't keep up with your ideas, maybe you ought to be thinking about another camera.

Consider a Minolta XK: the camera that was designed to bring out the best in you. As the first and only 35mm reflex to combine the advantages of electronics and the versatility of a total system, it offers unprecedented creative freedom and handling ease for the involved photographer.

An electronically controlled titanium shutter is at the heart of the XK. Its range of speeds is wider than on any camera in the world: from 16 full seconds to 1/2000th second. And it is remarkably quiet, vibration-free and accurate.

The XK's shutter sets itself automatically for correct exposure, according to the lens opening you select. Light is measured automatically by a built-in metering system so unique it's patented.

You can also set the XK's shutter manually without losing creative mastery over every picture situation. Because the Auto-Electro viewfinder shows shutter speeds, aperture and a low-light warning signal, you need never look away from your subject as you focus and compose.

Since your camera needs will almost certainly change, the XK is designed to change with them. You may switch to any of four interchangeable viewfinders or nine focusing screens. A full system of interchangeable Rokkor-X lenses, ranging from fisheye to super-telephoto, provides still more versatility.

Five years from now, all fine 35mm cameras will offer the innovations that have caused every major photographic magazine to acclaim the Minolta XK. If you're involved with photography, you'll find the Minolta XK is a camera worth examining personally. For the name of your nearest retailer and literature, write Minolta Corporation, Advanced Systems Division, 101 Williams Drive, Ramsey, N.J. 07446. In Canada: Anglophoto Ltd., P.Q.

THE ELECTRONIC MINOLTA XK

laughed at, for the duty is light. They lug their own firearms over to the parade ground—usually the green—and they wear no bulky uniforms, only their comfortable farm smocks and homespun breeches. They don't worry about military courtesy because their officers are simply fellow townsmen elected to rank, perhaps because of experience in fighting the French and Indians.

Drill is rudimentary. At the beat of a drum, you assemble, shuffling into line, not without some horseplay and joshing. The lieutenant or the cap'n carries out a quick inspection, counting heads, chiding the tardy. Then at the proper orders you wheel into file and march around for a bit, and if you're lucky enough to have a fifer, he squeals out a tune like *The White Cockade* to help you keep step. And the drummer boy (maybe only a ten-year-old) thumps out the beat.

Then perhaps you try to get back into a line again—a battle line—and you end up by practicing firing a volley. Since powder is often scarce, this may be only a sudden dry snapping of strikers as everyone pulls his "tricker," and the little boys who are watching squeal with delight.

Finally, you swagger off to the tavern with its cool, dark paneling and the fragrant scent of rum. It has always been considered pretty good fun, the discipline.

Since the Philadelphia Congress, however, drill has become more serious. Two months ago a Massachusetts county reorganized its militia and elected new officers, making sure no Tories were included. Then about a third of the young men were chosen as shock troops, instantly available in time of trouble. "Minutemen" they are called—an old word that dates back to the French wars. This remodeling of the militia spreads to other Massachusetts counties. Soon towns like Bedford, Lincoln, Concord, Menotomy, Lexington and others all have Minutemen. And the idea crosses Colonial borders to New Hampshire and Connecticut and beyond.

Other changes in the system are becoming apparent. Some towns are organizing "alarm lists" of men either too old or too young for any sort of service except guarding supplies. Along with the increased mustering activity, the shortage of powder is getting worse. It used to be that a good many militia companies could save up enough for one fine volley at the end

The Mexican Collection: numbered issues in silver and gold. We take great pleasure in presenting this superb collection of figurines wrought in Sterling silver and 22K gold vermeil. Eight are replicas of famous art treasures from the permanent collection of the Mexican National Museum of Anthropology—done to scale and authorized by the museum. All are exquisitely detailed and painstakingly hand-finished. Each is tarnish-proof and bears an engraved issue number on its base plate. We think you'll be as proud to own and display these unique investment-wise collectibles, as we are to offer them.

Smiling Face. Totonac Culture. (top left) 3-1/4" high including base. Numbered Issue of 1,000, $225.

God Xochipilli. Aztec Culture. (top right) 3-5/16" high including base. Numbered Issue of 1,000, $265.

Atlante from Tula. Toltec Culture. (lower left) 4-5/8" high including base. Numbered Issue of 1,000, $225.

Mesoamerican Indian Girl. Contemporary rendition. (lower right) Red and yellow gold vermeil. 12-1/2" high including base. Numbered Issue of 300, $1850.

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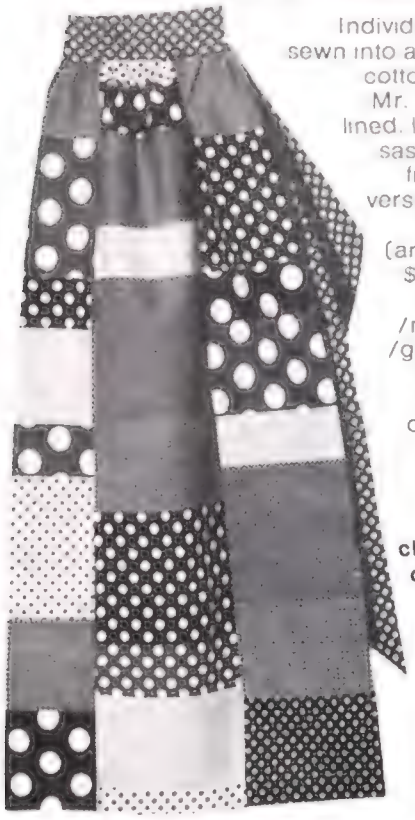

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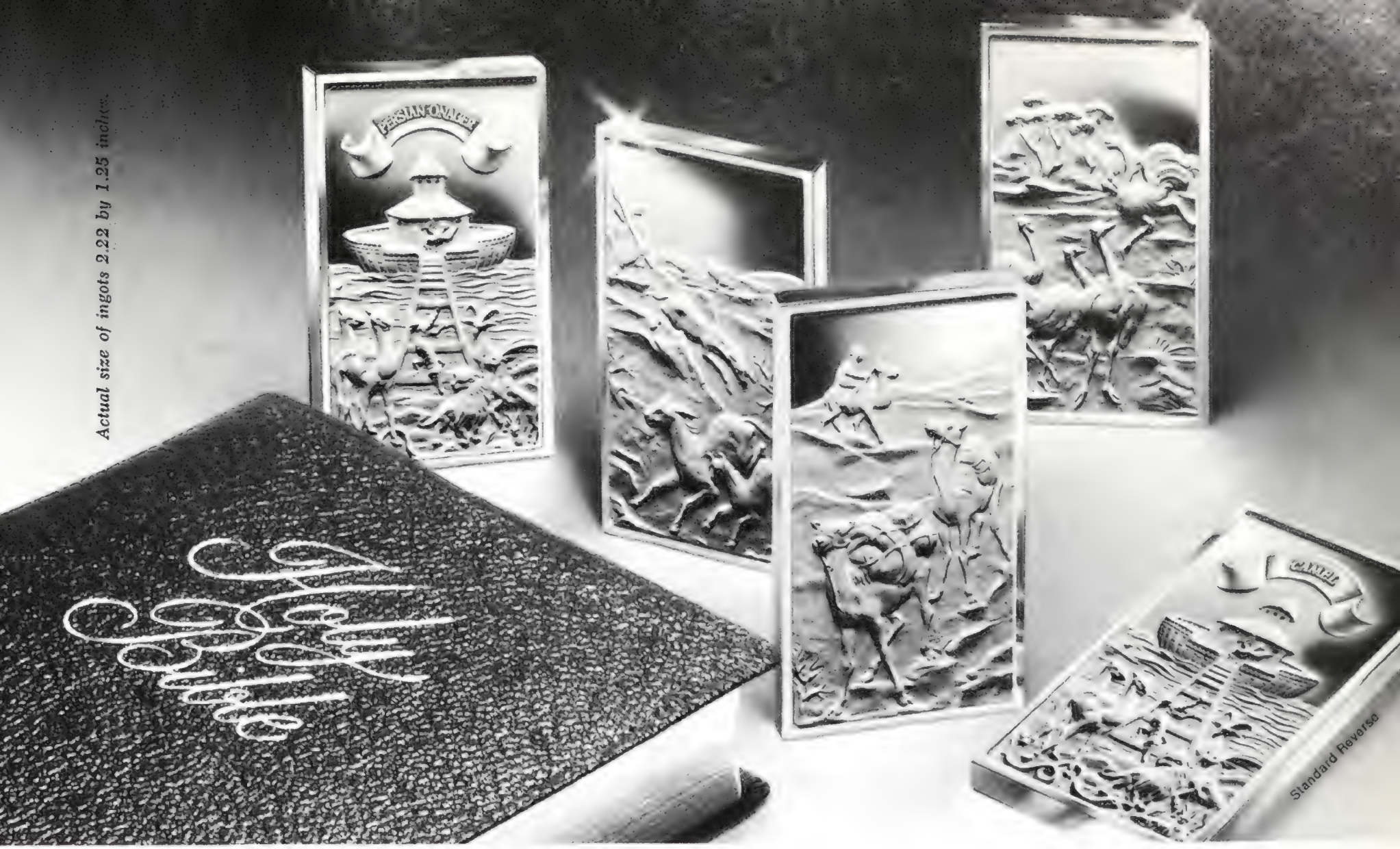
of the drill. The men would take the wooden plugs out of their flint holders and insert real flints, and then ram home some real powder with a bit of wadding. And if they felt cocky enough, they might try to do a *feu de joie,* firing in a certain kind of order, all down the line until someone forgot or did it too soon and they collapsed into giggles.

No more. All around Boston General Gage's redcoats have been searching towns and confiscating caches of powder. Men have barely enough stored away for normal hunting, much less for target practice or fancy French exhibitions. Well, the young men feel they don't need target practice, anyway, because muskets hit only what they feel like. If they had those rifles from Pennsylvania, it would be different, but most have never seen one. As for musket drill, marching in step and forming battle lines, the militiaman does it all in good humor because it's a diversion from farming. But when a man contemplates actually firing on an enemy —and now, in his mind's eye, he sees this unknown foeman clad in scarlet regimentals—he knows he will not long stay in line for any massed volley. "I will slip behind that tree," he says to himself, "or between those two boulders."

The discipline has changed in other ways. The rum afterward still tastes dark and warming, but the talk is no longer just silly japes and moonings over local girls. It's all full of news from the recently formed Committees of Safety, and it's spiced with rumors. The rumors can get pretty fierce. A couple of months ago one of Gage's patrols went over to Cambridge and Charlestown and rumors flew that it was a massive march, a second massacre. The militia turned out in a flash, from as far away as New Hampshire—20,000 men in all, they say—before the alarm was declared false.

Gage treads delicately between duty and disaster, containing the rebellious spirit around him and not provoking more of the same. He is a kind and careful man, married to an American from New Jersey. He is quite fond of the Colonials in a paternal sort of way. When a dustup occurs between a soldier and a townsman, as often happens, Gage almost always punishes the soldier. His troops call him Old Woman. They are getting pretty testy about having small boys yell "Lobster!" at them.

That call-out of militia shocked Gage.



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24 Original Works of Art

This unique collection of 24 individual works of art in solid sterling silver was created exclusively for The Biblical Wildlife Society by Dora de Pédery-Hunt, member of the Royal Canadian Academy of Art. Her sensitive and inspirational sculpture is part of the collections of Canada's National Gallery, the Belgian Royal Cabinet of Medals, the Dutch Royal Coin Cabinet, and the Smithsonian Institution.

Produced by The Franklin Mint

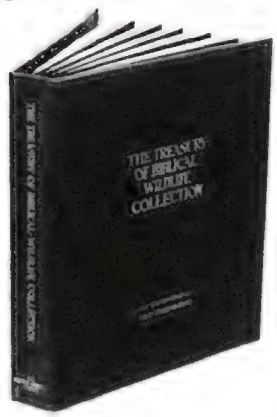
The Franklin Mint, world's foremost private mint, was selected for the production of these solid sterling silver ingots. Each proof quality ingot contains 750 grains of silver, 1.6 troy ounces. Each ingot is hallmarked and edge-numbered.

Limited Edition

The Treasury of Biblical Wildlife Collection is available to advance subscribers only. Sets are limited to one per subscriber. The total number of sets will be limited to the number of advance subscriptions received or postmarked by November 30, 1974. After the ingots have been struck for each subscriber the dies will be destroyed to assure the rarity of the collection.

The 24 ingots will be issued at the rate of one ingot per month at a cost of $42 each. This price will be guaranteed to each subscriber for the entire series no matter how high the price of silver.

Dora de Pédery-Hunt



A deluxe collector's album with parchment pages of biblical texts referring to the animals of the bible will be provided at no additional charge to each subscriber to The Treasury of Biblical Wildlife.

The Biblical Wildlife Society contribution to the protection and restoration of biblical wildlife is directed through the Holy Land Conservation Fund Inc., N. Y.

SUBSCRIPTION APPLICATION

Limit: One series per subscriber.

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Please accept my subscription application for one serially-numbered First Edition Proof Set of *The Treasury of Biblical Wildlife Collection*, minted for The Society by The Franklin Mint. The complete series will consist of 24 solid sterling silver ingots, to be issued at the rate of one ingot per month.

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"My tastes are very simple. I only want the very best of everything."

An eminent British prime minister was quoted as having made that statement.

Well, we guess just about everybody would like to have the very best of everything.

But for most of us, that just isn't possible. We can't afford a Rolls-Royce (with chauffeur), servants, summer and winter homes, etc.

But it is interesting to note that even those who can afford all those things still cannot buy or serve a better whisky than Maker's Mark.

And, as for the rest of us, no matter what our means, we can at least enjoy the very best of some things. One of those things is love, another is companionship. And speaking more materially, another is whisky.

Moderation is key.

If you drink in moderation, then the extra cost of Maker's Mark is amortized over quite a period. We'd be the first to admit that immoderate drinkers probably can't afford Maker's Mark. But then they really can't afford any whisky, can they?

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So, Maker's Mark will never compete for the mass market.

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For you?

Though it's not for everyman, it could very well be for you.

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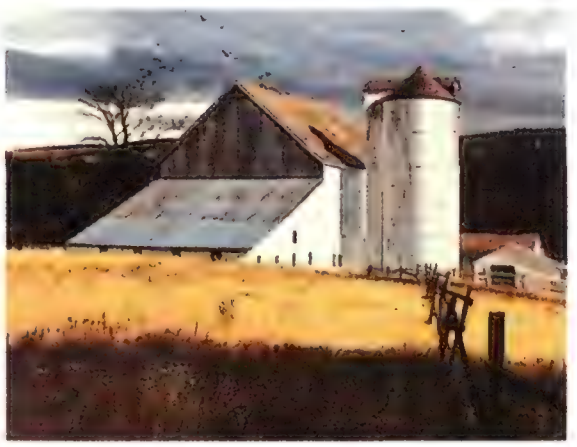
He has just written Lord Dartmouth, the King's Secretary of State, a new appraisal of the British military position: "If force is to be used at length, it must be a considerable one, and foreign troops must be hired. . . ." In Britain, though, most people feel it's not to worry about any trouble with those ridiculous American rustics and their hilarious military organizations. King George comes straight to the point in a letter to Lord North on the 18th of this month: "The New England governments are in a state of rebellion, blows must decide whether they are to be subject to this country or independent."

Yet life goes on in the kingdom. Samuel Johnson notes in his diary that on Advent Sunday, the 27th, "I considered that this

Samuel Johnson

day . . . was a proper time for a new course of life. I began to read the Greek Testament regularly at 160 verses every Sunday. This day I began with the Acts."

And on the 14th of this month a play called *The Maid of the Oaks* opens at Drury Lane. It is a splendid success and a feather in the cap of the witty and urbane soldier-Parliamentarian who wrote



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"Rural America"

by Tom Hoyne

What is rural America? For you, perhaps, the warm, sweet harvest smells of cider apples and new-mown hay . . . barnyard brooks or creaking windmills and weathervanes. Whatever the reverie, each of us has one. Barns, of course, have always been the symbols of our rural heritage. And now, on the eve of our celebration of the Bicentennial, Mildenhall has commissioned the distinguished artist, Thomas Hoyne, to capture that spirit for our times with this first edition series of four compelling rural landscapes.

Throughout his professional life . . . whether painting portraits of Nobel Prize recipients, early flying machines, or tall majestic sailing vessels, Thomas Hoyne has always returned to the land for his inspiration. A man of quiet country tastes, who chooses a village life in the shadow of a covered bridge, Thomas Hoyne's work demonstrates the eloquent dignity of our rural culture. Mildenhall is proud to share his insistence on not letting it vanish from the earth.

The set of four landscapes are exquisitely reproduced to the highest standards and printed with a French mat for your convenience. You will receive your "Rural America" Landscapes in a handsome portfolio with tissues dividing each reproduction. Delivery will be made in a heavy-duty flat book fold carton.

This first edition series can be purchased for $18.00 with postage and handling included. For prompt return of your order, complete the coupon and enclose it with a check or money order to: Mildenhall Enterprises, Inc., P.O. Box 211, Winnetka, Illinois 60093.

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it—and laboriously *re*wrote it under the guidance of his friend David Garrick. The author's name is John Burgoyne. One song he wrote for his opus becomes a London hit: "The World Turned Upside Down."

This fall, the world does indeed seem to be getting out of hand. In France, Anne Robert Jacques Turgot, King Louis XVI's able and determined finance minister, has sought to ease the government's extravagances by cutting off, recently, control over grain prices. The saving to France may or may not make up for the costly whims of lovely Queen Marie Antoinette, but Turgot's action certainly boosts the price of grain.

And now, disastrously, the autumn harvest turns out to be grimly inadequate. Up go the grain prices even more, and louder grow the grumblings of the French consumers. Turgot resigns himself to unpopularity—after all, solvency is what he's after. At least France is not at war. Sending an army overseas would surely empty the coffers.

In China, the emperor Chi'ien Lung is coping in a suitably Oriental way with a group in Shantung called the White Lotus Society which, despite a pleasant era of peace, is expressing dangerously revolutionary thoughts.

Back in the American Colonies, you can't even be sure that a black is a slave, or at least an indigent, these days. Out on the edge of Baltimore, a remarkably educated free black named Benjamin Banneker is 43 this month. He is growing tobacco, reading and studying mathematics and watching with interest the building of the Ellicott Lower Mills near his property.

In Kentucky, speaking of birthdays, Daniel Boone turns 40. His life is a long way in distance, time and style from a mechanically inclined youngster named Robert Fulton, back East, who celebrates his ninth birthday.

On the last day of November, the vessel *London Packet* arrives in Philadelphia, and a passenger, Thomas Paine, is carried ashore, critically ill with typhus. He gets good care because he has the patronage of a noted Philadelphian, Benjamin Franklin, who is still back in London trying to patch up the British Empire.

EDWARDS PARK

Next month: New Hampshire patriots strike a blow.

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Overpopulation: no solution unless world agrees there IS a problem

On the stairs of Bucharest's Palace of the Republic, exhibit of Indian village life served as a graphic reminder to the delegates at the World Population Conference of problems they discussed. Above, Artist

While 4,000 delegates in Bucharest differed about threat of overcrowded Earth, some 3,000,000 hungry mouths came into being

Text by Donald Gould

Photographs by Ralph Crane

Rajeev Sethi explains exhibit to Mexico's Antonio Carrillo Flores, Romania's George Macovescu (right).

The facts are both formidable and simple. By the turn of the century the number of people in the world will have doubled to reach somewhere around the seven-billion mark. This kind of figure does not mean much to the average mind, but there are other ways of describing what is going on. Every second another 3.2 bodies are added to the mass of human beings striving to wrest a living from the thin film of vital matter which coats the surface of the Earth. That is 11,000 extra bodies every hour, and 95 million every year.

This presents the species, *Homo sapiens*, with the gravest threat to its survival it has ever faced—a threat so menacing that the gloomier prophets foresee the possibility of mankind destroying itself in an orgy of nuclear slaughter before today's children have completed their own families. The ultrapessimists argue that within the next three decades every last developing nation, including small tropical republics, will have atomic weapons in their armories, and that by then the competition for even a pauper's share of the essential props of life (food, energy and raw materials) will have become so fierce that desperate and starving communities, having nothing to lose, will attack their neighbors in a final effort to grab a little of what they need in order not to die.

At the opposite pole there are those who choose to believe that science, technology and man's unique capacity to adapt will prove equal to the task of solving the prodigious problems which even they, the super-optimists, recognize will arise within the lifetime of most of us present on this Earth.

It is against this background of harsh facts and greatly conflicting attitudes that the first international world population conference took place in Bucharest recently. Some of the four or five thousand visitors who made the trip to Romania for the event professed themselves happy simply because representatives from

Woman observer catnaps at more informal Population Tribune which met alongside U.N. gathering.

the governments of almost every country in the world (plus a number of revolutionary movements such as the Palestine Liberation Organization) met under the auspices of the United Nations to talk about the situation. Other, less sanguine participants and observers felt that the fact that this was indeed the first intergovernmental get-together on the subject indicated all too plainly the lack of urgency with which our rulers regard a dangerous happening whose shape has been apparent for very many years.

While the representatives met in Bucharest, these were the circumstances which they had to confront: Some two-thirds of the peoples of the world are undernourished, and many millions are actually starving. In parts of Latin America malnutrition is the chief or contributory cause of considerably over half of the deaths among children aged between one and four. More than two-thirds of the 800 million children growing up in developing countries are or will be sick and often permanently disabled as a result of diseases caused or made worse by a lack of calories or proteins.

On top of this chronic insufficiency, many of the poorly developed countries suffer frequent disruption of an already inadequate food supply as the result of a spell of bad growing weather. They have no reserves, so that any significant damage to crops (as possibly in the United States and USSR this year) produces an immediate disaster situation. Shortly before the Bucharest conference, an international rescue operation had to be mounted in an attempt to help at least some of the victims of a severe famine in Bangladesh. Now, only a few weeks later, reports are coming through of a comparable calamity in India. The London *Times* quotes Indian officials as saying that "15 million of the 50 million West Bengalis are getting only one meal a week. People are dying through eating grass, roots and rotten food." But perhaps the grimmest comment lies in a recent report in *The Guardian:* "The news that a serious famine is building up in India has been slowly reported because at this time of year a degree of starvation is normal."

Unfortunately, news items of this kind make little impact upon the average reader in the West, partly because they are commonplace, partly because we have our own more immediate problems to worry about, but principally, perhaps, because people to whom the word "hunger" means no more than the feeling they get in their minds and bellies when the third good meal of the day is served up 90 minutes late, cannot begin to appreciate what a famine means in terms of

physical and mental anguish. We can imagine and share the grief felt by the parents of a cherished child who is dying. We cannot conceive of the crushing bitterness and despair felt by a mother watching her children shrink and lose hold of life for want of the food she cannot provide.

In sharp contrast, a majority of these Third-World nations, vigorously supported—for whatever reasons—by the Communist bloc, maintain that the answer lies in a greatly accelerated exploitation of land, minerals and human ingenuity, and that for this to happen rapidly more, rather than fewer, pairs of hands are needed. This view was precisely stated by Nicolae Ceausescu, President of Romania, in an address of welcome to the conference. "Science," he said, "will reveal new food resources and also increase soil fertility on the entire earth's surface which will allow for big quantities of additional plant and animal output for consumption."

The Chinese, too, were prominent among the supporters of this expansionist approach, although they are themselves controlling growth. But the most tireless campaigners for a program of ever-increasing production and the bitterest opponent of family limitation and birth control were the Argentinians. Before the conference began the U.N. Secretariat had prepared the draft of a document called the World Population Plan of Action. This 93-paragraph statement was designed to sum up the recommendations of the conference concerning the broad nature of the steps which the nations of the world should take over the course of the next ten years or so in order to contain

Outside Tribune meeting, Lola Langley of New York shows birth control devices to India's Munya Jayaran.

A delegate from Africa listens to translation at U.N. meeting, a Chinese delegate casts his nation's vote

and a member of audience at the Population Tribune questions a speaker on the old matter of Vietnam.

A Third-World delegate curiously contemplates a gambling machine during a break in the meetings.

the population problem. The draft was the fruit of two years of consultations with expert advisers and a great deal of traveling, summitry and confabulation by Antonio Carrillo Flores, the Mexican Secretary-General of the conference. It was a bland, perhaps insipid, document in view of the gravity and the urgency of the situation. The boldest exhortation it contained was that governments should at least have some population policy, and that they should make plans now designed to allow them to achieve their chosen growth rates by 1985. For the rest, it consisted of a series of imprecise and platitudinous statements paying lip service to such unexceptional objectives as a general reduction in infant mortality and increase in longevity, better health services for all, improving the status of women, and so on.

Nevertheless, the Argentine delegation, led by His Excellency Juan Carlos Beltramino, found it meet to propose amendments to 68 paragraphs of the plan, designed to water it down still further so that references to birth control should be reduced to "reasonable proportions," and so that the emphasis on "social and economic growth" should take pride of place.

Outside the conference chamber when the affair was nearly ended, a spokesman for the Argentinians pointed out that his country was a traditional food producer but that, given more workers, its contribution to the world's larder could be vastly increased. He dismissed as fanciful the suggestion that his government wished to increase the population in order to be in a better position to defend its territories against the possible incursions of covetous neighbors.

And so it was that from the first day the conference became polarized into two groups—the one believing in the absolute need to curb population growth, and quickly, and the other equally sure that the Earth can support as many people as are ever likely to be bred. The crucial question as to which of these two doctrines might be correct, and which one disastrously wrong, remained unanswered.

Can a consideration of the circumstances, in the absence of any ideological or nationalistic prepossessions, help us to decide which course to back?

There are experts (theorists, anyway) who, on the basis of calculation rather than wishful thinking, have suggested that enough food could be produced, using the crops and farming techniques already available, to support up to 60 billion people (compared to the nearly 4 billion now alive). Such predictions fall into the science-fiction bracket, for they assume the intensive and super-efficient application of technology to food production on a global scale, and they conve-

Donald Gould, M.D., former editor of New Scientist, *frequently contributes articles to* SMITHSONIAN.

niently ignore the impossibility of providing the fertilizers, the water, the machinery, the energy, the transport, or even the organization and expertise that would be needed to establish and sustain this kind of factory farming (now being practiced on two or three thousand acres of land in places like California and Holland) over vast extra tracts of the predominantly barren and hostile surface of the globe. Perhaps even more importantly, such predictions ignore the unforeseen and often disastrous side-effects which brave and costly attempts to increase the fertility of the land have already produced.

It's more than simply producing more food

Nevertheless, and despite the difficulties and dangers involved, it is not inconceivable that world food production could be doubled in time to meet the needs of the year 2000 (although something nearer a three or fourfold increase would be needed if everybody is to be well fed). Apart from the more efficient production of conventional crops, ways have already been found for producing protein from bacteria grown on mineral oil, and for producing foodstuffs from forest greenery of a kind which has not so far been used for nourishment. Two workers at the University of Manchester in England have even made a promising start on the unlikely business of producing edible protein from old plastic bottles.

So let us assume that the thing can be done. We are still left to wonder whether it will be done. That famine in northern India is primarily the result of a freak combination of sudden floods and prolonged droughts, but the situation has been worsened by happenings far away from the stricken areas. The oil crisis, which was the result not of some natural and unavoidable disaster but of political and commercial decisions taken by the Arabs, led to a sudden shortage of fertilizers, which require a lot of energy for their manufacture. The oil shortage also led to a lack of diesel oil and electricity needed to drive irrigation plants. Under these circumstances and with the failure of the rains, the farmers of the Punjab and Hariana, who had benefited greatly from using the superior strains of cereal evolved by the scientists who launched the "green revolution," were confounded. The finest seed in the world can't flourish without food and water. So the Indian farmers turned their cattle out to graze the plants that were to be this summer's harvest.

Meanwhile, inflation has raised costs to such an extent that the machinery for the free distribution of grain to the poor by states has broken down. Those farmers who do have stocks won't sell at official prices to the authorities when they can make a killing from wealthier customers on the open market.

Folk artists provide graphic population message: the tragic results of having too many children.

John D. Rockefeller III chose to attend the Population Tribune so he could speak his mind. Long a leading U.S. advocate of birth control, he told his audience that family planning has so far proved to be a failure.

Philippines' Rafael Salas: It seemed extraordinary that the conference "should have been delayed so long."

For Great Britain's Lady Gaitskell, the meeting seemed too big and, she said, "Big is not beautiful."

Finally, there are no great stocks of surplus wheat in the United States (as there were until just recently) ready for instant shipment to a famine zone. And in his first address to the General Assembly of the United Nations, President Ford has now hinted that the food needed by the developing nations may have to be paid for with the oil which America and other nations so eagerly desire. "The attempt by any country to use one commodity for political purposes," he said, "will inevitably tempt other countries to use their commodities for their own purposes."

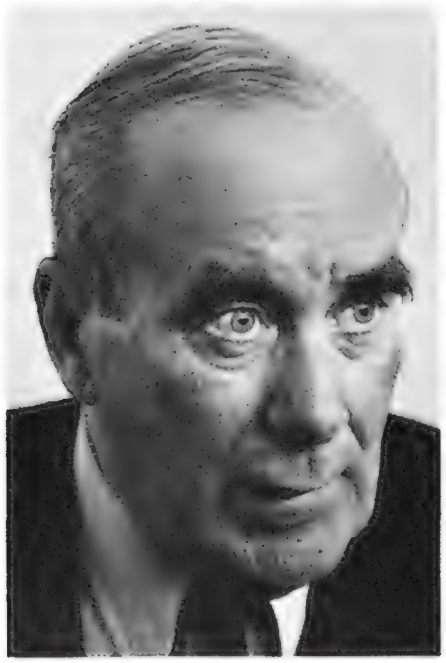
The President has a case. The Arabs have a case. Even the Punjabi farmers who hoard their grain have a case. Meanwhile people die.

There is no point in arguing who may be most to blame for the death by starvation of countless people in a world still capable of providing ample food for all, but there is a point in recognizing that it happens.

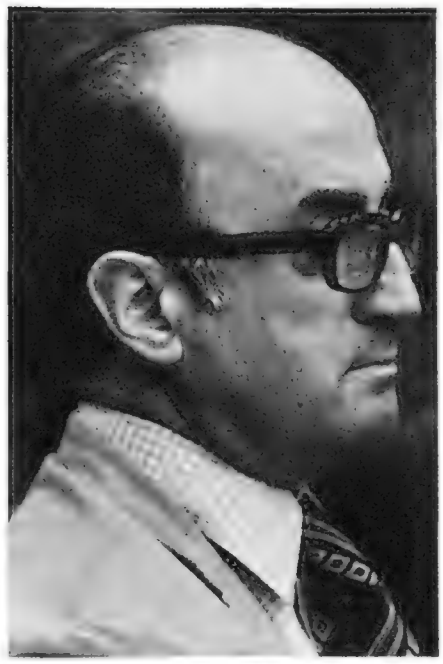
Even if the task of feeding the world's people is technically within our power, a set of attitudes and political institutions which can't produce order in the world as it is today are quite unlikely to sustain any kind of stability when the competition has doubled.

Is the alternative policy of keeping our numbers down any more likely to succeed? Again, the outlook seems gloomy. John D. Rockefeller III traveled to Bucharest to address the Population Tribune. This was a meeting of all kinds of non-governmental people interested in population. They met in the law school of Bucharest University while the official government delegates pursued their turgid business in grander halls elsewhere. John D. Rockefeller has been a fervent propagandist for family planning for 40 years. He presided over the recent Presidential Commission on U.S. Population Growth. He was bound to be asked to join the official delegation, but he jumped the gun by telling Washington he wouldn't be available. He wanted to join the unofficial and very much livelier debate at the Tribune so that he could speak his own mind freely.

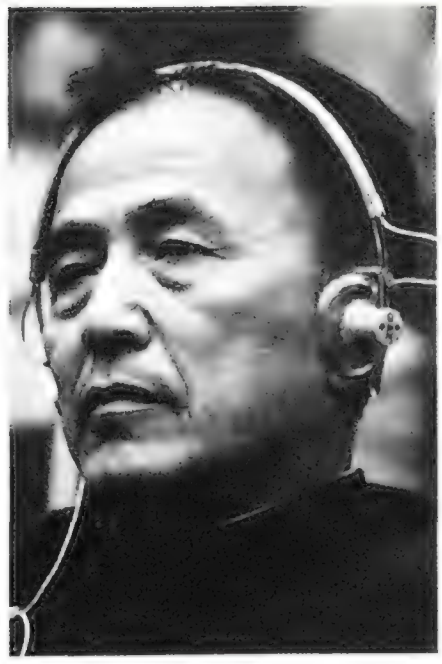
He told us that his long, costly and dedicated efforts in the realm of family planning had failed. Telling women the facts of life and handing out free contraceptives made only the slightest impact on the birthrate. Women stopped having babies when they were good and ready to stop having babies and not before. He hadn't abandoned all faith in the coil and the pill, but he now recognized that the first need was to create the circumstances in which it made sense (in terms of cash, comfort and the daily round) to keep the family



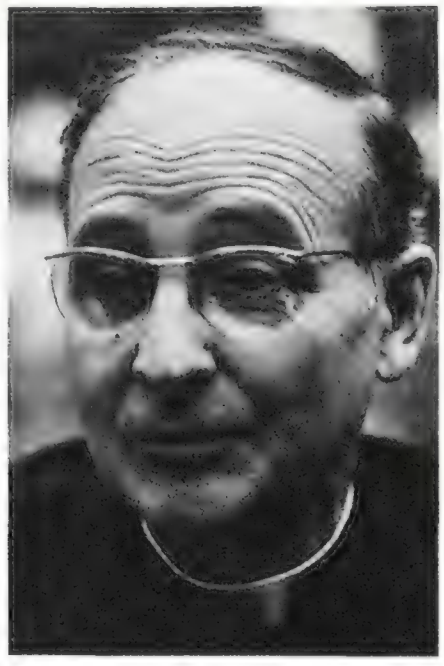
The U.N. veteran Lord Caradon ponders a witty remark to avoid bickering.



Juan Carlos Beltramino led the Argentinians in a vigorous attack on population controls.



China's Huang Shu-tse: faith in the land's productivity and the creativity of the masses.



Monsignor Edouard Gagnon, delegate from the Holy See: faith in God and in the resilience of Man.

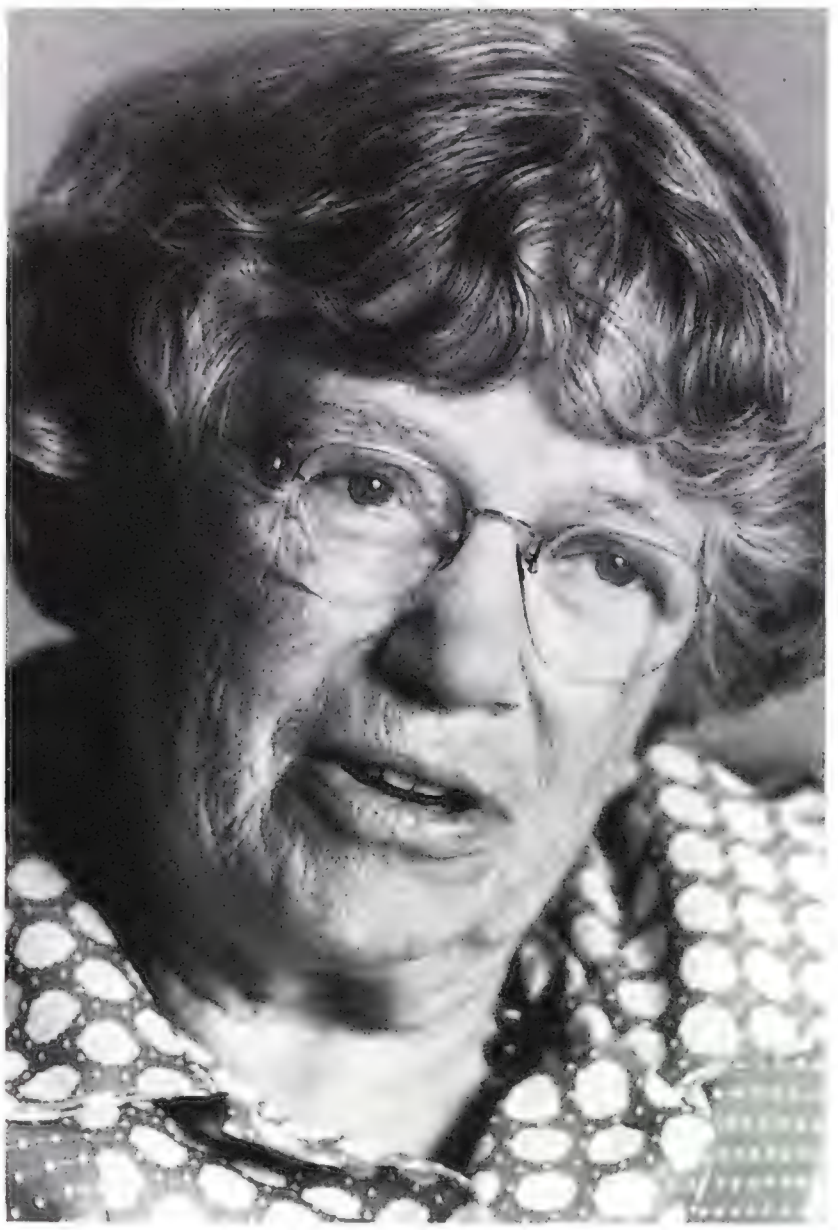
neat and small. Rockefeller, looking at life as it is from the viewpoint of somebody desperately wanting to see the birthrate fall, has gained the same insight as the anonymous spokesman for Argentina, who desperately wanted to see the babies tumbling out. The Argentinian had said plaintively that the standard of living and education in his country was too high; it made the women unwilling to have more children than they could manage without destroying their pleasant circumstances.

The same story, but from the other side of the street, was told by Dr. Yusuf Ali Eraj, a gynecologist from Kenya. He told how, within his territory, fertility clinics attracted more customers than birth-control clinics. Most Kenyans still wanted to have as many children as possible. A lot of children die, which is one reason for building up a reserve, but, more importantly, those who survive provide an extra pair of hands and they can contribute more to the family income than they take out of it. Dr. Yusuf's recommended instant remedy is to sack the expensive and ineffectual family-planning worthies and use the money saved to build schools ("which would be made like other dwellings around with mud and grass and pieces of wood") and to hire teachers. If the village children go to school, says Dr. Yusuf, they won't be available to work in the fields. And they'll need books. And their parents will start being proud of them and will want to buy them clothes. They'll become an expense, not extra income. Then the parents will see the attraction of having just one or two they can look after well, not eight or ten as so much cheap labor.

So something at least came out of the costly Bucharest conclave. It became clear that nobody present (save for a few dedicated family planners displaying their wares in the corridors at the Tribune) had the smallest belief in the myth that women are slaves to the tyranny of sex—that they spawn children once a year throughout their reproductive lives as the inevitable result of having to act as the passive and unthinking objects of their menfolk's lust—and that, given an IUD and a little elementary coaching in the physiology of reproduction, they would all gratefully limit their output to the two offspring which the liberated ladies of the West find constitute the ideal family.

There were a number of heartfelt statements made to the effect that the quality of life throughout the world must be improved, and that the fortunate must help the unfortunate, and that the status of women and mothers must be raised, but nobody proposed any practical steps for bringing these desirable events about. Some delegates couldn't even find the time to pay lip service to such fine ideals, but spent their stint at the rostrum playing the traditional U.N. game of "slam thy neighbor." At the end of it all nobody had even begun to explain how, within 25 years from now, we could so change the shape of the world and the nature of man that seven billion people can hope to satisfy their needs and live in peace together.

But nobody would admit defeat. Monsignor Edouard Gagnon, who headed the delegation from the Holy See, put his trust in God and the resilience of Man and expressed the belief that soon we should understand the mysteries of the flesh so much more perfectly



Dr. Margaret Mead attended the Population Tribune and remained optimistic throughout: "Oh, we can still do something—otherwise I wouldn't be here. I wouldn't make a profession of being a doom-watcher."

that all women would be able to avoid pregnancy at will without resorting to unnatural means. Lord Caradon of Britain, a U.N. veteran, discounted all the petty bickering that had taken place and coined an epigram, saying "If you try to deal with population without at the same time dealing with development, that's an insult, but if you attempt to deal with development without at the same time dealing with population, that's a deceit."

Rafael Salas, executive director of the U.N. Fund for Population Activities, was sure that the industrial nations will have to curb their consumption of almost everything pretty soon, like it or not, for the raw materials simply wouldn't be obtainable on the scale of the past decades. Meanwhile, he was happy in the knowledge that the work he had started five years ago with a tiny budget of $3 million has expanded since then to $175 million spent on more than 900 projects, spread throughout the developing world, and that this mounting assault on the population problem would develop steadily regardless of international chatfests or political squabbles. Most importantly, he felt that the notion of limits had finally sunk in.

And last of all there was Margaret Mead, the Grande Dame of the students of mankind. Was she despairing? Not at all.

"There are a very large number of countries—about 70—which have going population policies. You notice that both Cuba and Romania have signed contracts with the U.N. Population Fund—at the same time as they were denouncing it as a Malthusian approach. So you look at their behavior rather than their words."

Is there the smallest chance of bringing about the drastic social, political and economic changes which must happen if we're to survive? "Well, how did we do it to start with?" asked Dr. Mead. "If you go back and look at the world of 1939 and look at the world today, you'll see what extraordinary changes have taken place—technologically, politically, socially—in just this very brief period. How did we do that? People seem to feel that the world has been the way it is forever, and that now we're faced with the enormous task of changing everything. They don't seem to realize how extraordinarily new most of the circumstances we're familiar with today really are."

Is there time?

"Well, I don't know what it means to say there isn't time. If we start now there is a possibility of ending up with a population two billion less than it otherwise would have been at the turn of the century."

Let's hope, for all our sakes, that the excellent, wise and apparently immortal Dr. Margaret Mead is right.

Standing committee in session beneath ornate ceiling of 19th-century concert hall, the Atheneul Roman.

OECD

Photographs by Lee Boltin

The Faces of Jesus: no two artists see him the same way

Lacking any physical description, those who wished to depict him have had to rely imaginatively on their own visions

In wood, metal, papier-mâché and glass, on linen, parchment, plaster and clay, for a thousand years and centuries more, people have represented the face of Jesus, of whom there is not even a physical description in the New Testament.

In evoking their images of him they have, through the labyrinth of time, reflected themselves, their societies and civilizations, their best and worst natures, fears and glories, expectations and hopes; in a sense—their lives and their souls.

The faces of Jesus are multiple reflections, then, and what one sees in them is not only the subject, but the artist and, finally, oneself. It is a subtle composite and a compelling one of immense evocativeness and power —a revolving, reflexive metaphysical mirror.

He is, of course, in any sense of the word and of the world, the Man Without a Face and that is because he is the man of all faces and of endless faces. There is an infinity of expressions lying within the metaphysical compass. And, because he is the Man Without a Face he is also for so many the Face of Man.

The photographs are from *The Faces of Jesus,* a Riverwood book about to be published by Simon and Schuster with text by novelist Frederick Buechner, who is an ordained, although non-practicing, Protestant minister. The quotations in the captions are his.

Lee Boltin has photographed many beautiful and rare objects for SMITHSONIAN, *most recently the jewelry displayed in the June 1974 issue.*

Lee Boltin's photographic pilgrimage can be said to have begun during years of work at New York's Metropolitan Museum, where he passed repeatedly through the Medieval Treasure room collection. For this book, however, looking for something specific and seeing a piece as a subject for explicit photography, the experience became revelatory and informed his journeys in search of his subject.

"I wanted," he says, "to stay away from the obvious manifestations of Jesus," but he did spend arduous time amongst the riches of the Vatican. The journey, in addition, led to discoveries in unexpected places. And so Boltin, admittedly non-religious, found himself one afternoon in a windblown shack containing a trove of religious material almost within sight of his own home in Croton-on-Hudson, New York. It was here that he found, among other treasures of the little known, the remarkable, beautifully executed miniature (2½ inches high) head of hardwood from Africa, which is on the cover of this issue.

In making these photographs, which must have an existence of their own, however related to the actual object transformed, Boltin was searching, essentially, for an awareness of what was going on in the mind of those who worked on the material, that elusive but indelible presence which is not seen in the work but without which the work would not be what it is. "I do not think one can do a good job of presenting a work of art through photography without having some manifest sense of this." Thus he has tried to set himself into the mood of the artist struggling with every conceivable kind of material, in an attempt to understand how the artist touched the piece. The problem always, of course, was how to catch this *in what the camera can do.*

And overriding all are the words in the hymn which, according to the apocryphal Acts of John, Jesus sang to his disciples at their last meal together:

"A mirror am I to thee that perceivest me."

The Christ Child holding an orb

This is a detail from a silver and gilt statuette (French, early 15th century) of the perhaps legendary (according to recent Catholic thinking) St. Christopher carrying the Child across a stream. When he complained, "Had I borne the whole world on my back, it could not have weighed heavier than you," the Child replied: "Marvel not, for you have borne upon your back the world and him who created it."

Metropolitan Museum of Art, gift of J. Pierpont Morgan, 1917

Jesus at the Last Supper

Describing this poignant detail from a limestone relief of the Last Supper (Germany, late 15th century), author Buechner writes: "They are all old men. . . . Jesus is also an old man. . . . The sculptor has given him no halo or any other badge of honor to single him out, but somehow he has managed to suggest that Jesus is more fully present at that stone table than any of the rest of them."

Metropolitan Museum of Art, gift of J. Pierpont Morgan, 1917

The Baptism of Christ

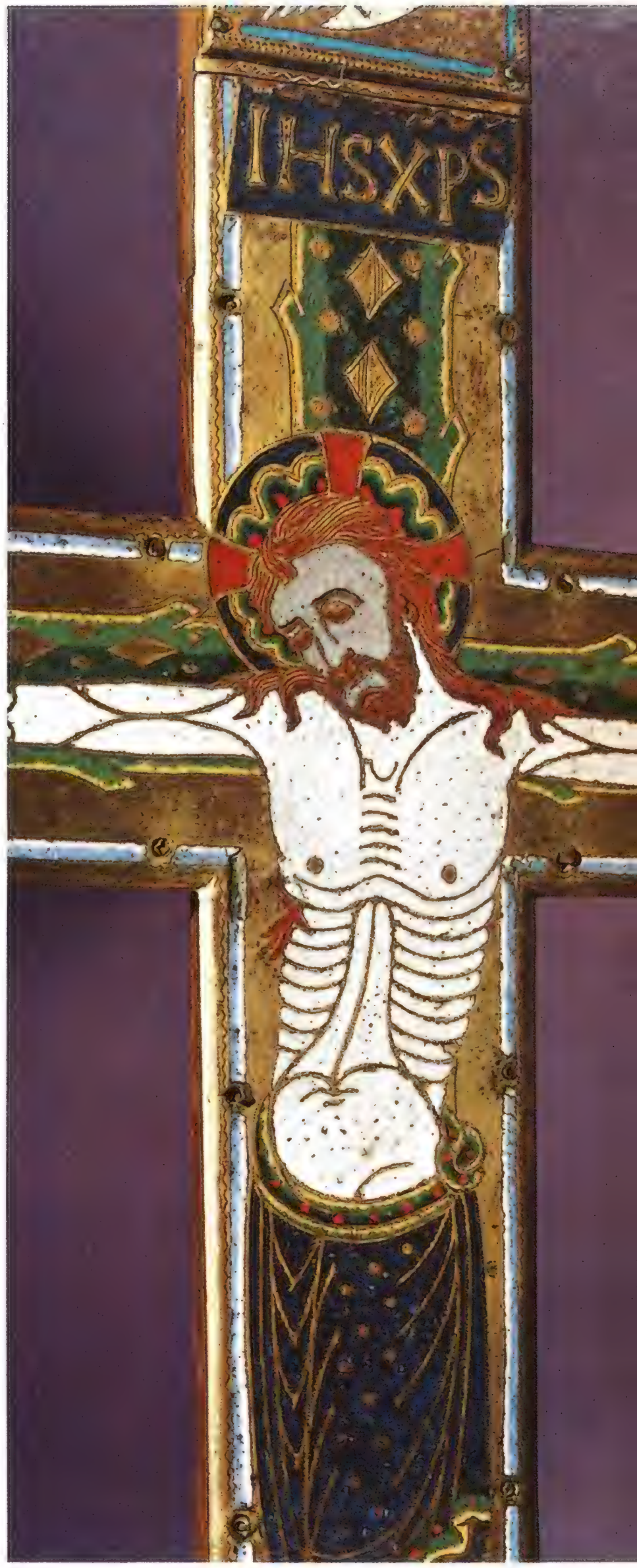
An anonymous artist carved the polychromed wood altarpiece (Germany, late 15th century) of which this expressively modeled head is a detail. "The face of Jesus is pale as ivory," says Buechner, "only his cheeks flushed and feverish, as he awaits the cleansing water. . . . His glance is sideways, inward, as though something buried deep within himself is already inching slowly toward the sun."

Metropolitan Museum of Art, The Cloisters

A Trinitarian Jesus

This painting in oil and tempera on a wood panel (Flanders, about 1500) is an attempt to show Jesus as the embodiment of the Trinity—Father, Son and Holy Ghost. Any such exceedingly literal interpretation of the doctrine was bound to be regarded by the Church as heretical, and paintings of this type are very rare. The rendering of the jewels is in the Flemish tradition of Jan van Eyck.

Courtesy H. Shickman Gallery, New York



Crucifixion in enameled metal

A detail from a processional cross in champlevé enamel (France, Limoges, about 1200). In the champlevé process, areas of the design intended to be in color are carefully cut away from the surface of the plate, leaving thin walls of metal between them. These depressions are then filled with powdered enamel and the object is fired. The surface is polished to give a jewel-like finish.

Metropolitan Museum of Art

St. Veronica's Veil

This is one of several versions of the subject painted by the great 17th-century Spanish artist, Francisco de Zurbarán. According to legend, Veronica was moved to pity by the sight of Jesus staggering under the cross, and handed him her kerchief to wipe his brow. When he returned it to her, it bore a miraculously imprinted image of his face. The purported relic is in St. Peter's.

Nationalmuseum, Stockholm

The Crucified One

This Mexican folk image is so cleverly fashioned of woven straw that it even includes the INRI (*Iesus Nazarenus Rex Iudaeorum*—Jesus of Nazareth, King of the Jews) on the plaque above his head.

Collection of James and Gaynell Cronin

Pietà—a modern version

Pietà means pity, and it is the name given to one of the central themes of Christian iconography—that of the Virgin cradling the dead Christ on her knees. It became a popular subject in the early 14th century, but the most famous example is probably Michelangelo's marble group in St. Peter's. This detail is from a modern version (1962) in bronze by the Yugoslav-American sculptor, Ivan Mestrovic.

Vatican Museum of Contemporary Christian Art

Christ of the Flagellation

Here is a powerful 20th-century painting by David Alfaro Siqueiros—with Orozco and Rivera, one of the "Big Three" of Mexico's revolutionary artists. Jesus is "bound to the whipping post facing us but with his head wrenched sideways in an ecstasy of pain as the lashes fall. . . . His manacled hands are thrust forward at us, the knuckles abraded and raw."

Vatican Museum of Contemporary Christian Art

A scrimshaw Crucifixion

"Some 19th-century sailor does him in scrimshaw, scratching him out with a knife on the tooth of a whale with its cusp whittled to look like some bird of prey. Here Jesus is shapeless and white, a barrel-chested Moby Dick of a man . . . melting like wax. Did the sailorman know the 22nd Psalm that Jesus quoted from the cross with its 'my heart is like wax, it is melted in my breast'?"

Whaling Museum, Nantucket, Massachusetts

Corpus Christi

The *corpus,* or body, of bronze gilt (France, 12th century) was once fastened to a processional cross, probably wooden. "With his arms winged out and his head bent, Jesus is flying through the royal purple night. For the first time he looks definitely Semitic with the shape of his nose, the cut of his beard, the way he has somehow shrugged off his cross. He is Abraham, Shylock. He is a Jew here."

Metropolitan Museum of Art

More oil from

How Exxon is squeezing additional oil out of a 55-year-old field.

A popular myth has it that oil is found in large underground lakes or pools. Actually, when oil and natural gas are discovered they are inside sedimentary rock. They are trapped in the tiny pores of limestone or sandstone as far as five miles underground.

Usually, when a well is drilled into oil-saturated rock, natural underground pressures force the oil to *flow through the rock* to the well and then to the surface.

However, in many oil fields these natural pressures are not strong enough to move the oil to the well. Or, over time, they may have diminished to the point where they must be supplemented by additional pressure. This additional pressure is provided by "secondary recovery" methods.

Sample drilling cores taken from oil-saturated rock formations in Alaska, Texas and Saudi Arabia. Oil and gas must come from and flow through rock like this before they reach the well bore.

Forcing water deep into the oil-bearing rock.

The most widespread secondary recovery method in use throughout the oil industry is *waterflooding,* which was introduced over 30 years ago. Water is pumped into the oil-bearing rock to flush out more of the oil than would be produced by natural, or primary forces.

On the average, natural pressures move only about 15-20% of a field's oil from the underground rock up to the surface. By using secondary recovery technology, the final yield can be increased to an average of about 35%.

The Hewitt Field—a case in point.

The Hewitt oil field, discovered in 1919, near Ardmore, Oklahoma, is operated by Exxon and several other companies. Originally, this field produced nearly 30 thousand barrels of oil a day. However, the depletion of natural underground pressures gradually reduced Hewitt's production to the point where the field needed waterflooding.

In 1969, Exxon and other owners began a cooperative secondary recovery waterflood project, which has since cost about $20 million.

Engineers now estimate that the Hewitt field ultimately will produce 35% of the original oil in place. Without the use of waterflooding, total recovery had been estimated at only 20%.

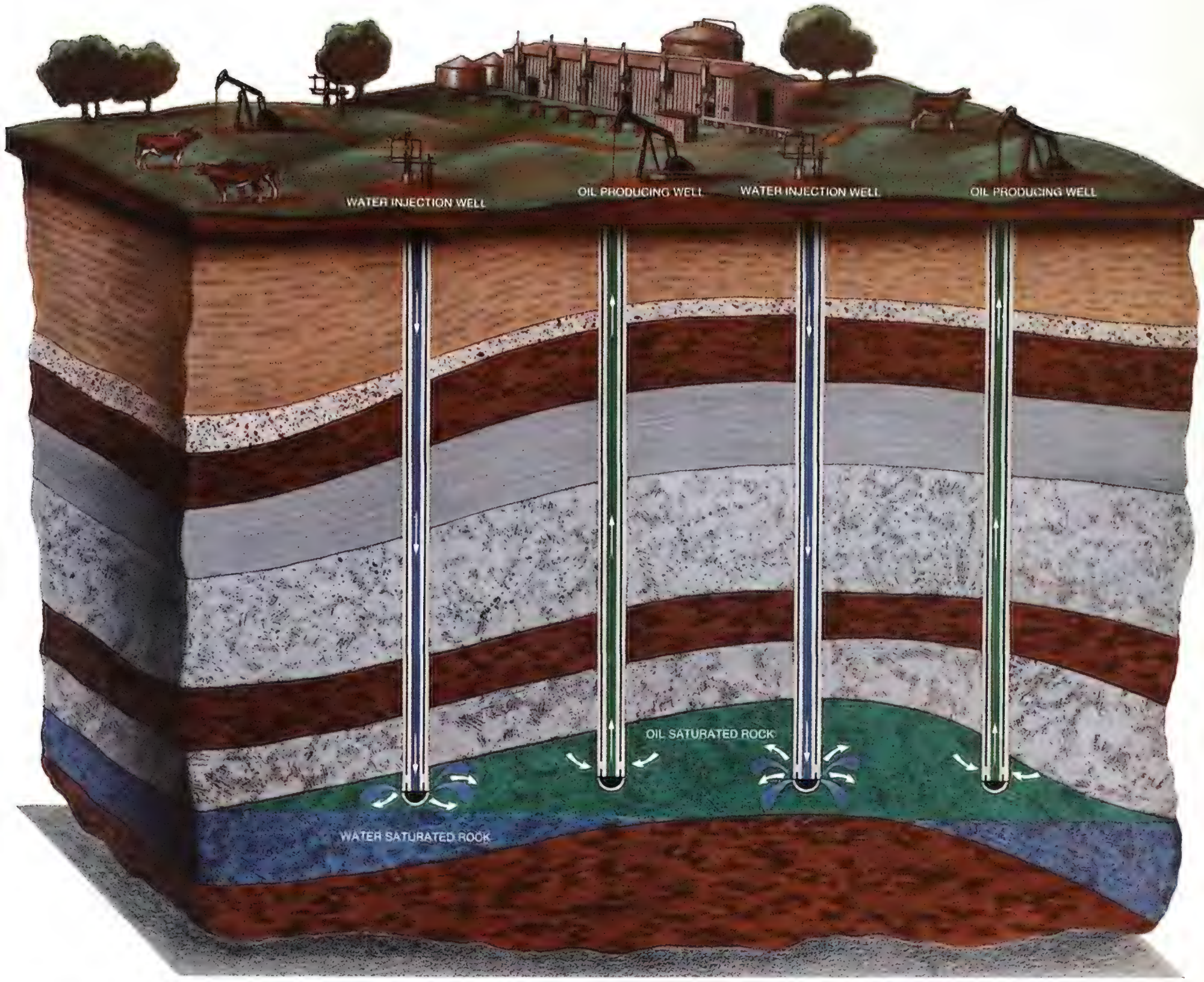
Sometimes, but not at Hewitt, natural gas is injected instead of water. However, the efficiency of waterflooding usually makes it more attractive.

An experiment using heat and subterranean "detergents."

Even after an oil field is subjected to secondary recovery techniques, such as water and gas injection, a large percentage of the oil still remains locked in the pores of the rock. So for many years, Exxon has been experimenting with tertiary recovery methods designed to recover more of this oil.

In one experimental process, a "detergent" or surfactant is pumped into the rock. This agent works like a laundry detergent that removes oil from a shirt—it flushes out the droplets of oil which still remain in the pores of the rock. In some cases, particularly where the oil is thicker, sometimes nearly the consistency of molasses, steam injection also is being tested. The hot steam heats the oil, making it flow more freely.

old wells.



Artist's conception of the Hewitt oil field located near Ardmore, Oklahoma. Large quantities of water are being injected into the oil-saturated rock to significantly increase the oil production.

In perhaps the most dramatic oil-recovery technique, air is injected into the rock formation holding the oil. This injected air supports controlled underground combustion, which heats the oil, causes it to flow more readily and drives it to the well.

In addition, Exxon is testing and evaluating several other tertiary techniques.

A realistic look at the future.

To date, about 450 billion barrels of oil have been found and documented in the United States. Even after additional recovery efforts, like the waterflooding at Hewitt, are applied, some 300 billion barrels of this oil will still remain locked in the pores of rock. Today, there is no way to recover all of this oil.

But scientists believe that experimental "tertiary" techniques like "detergents" and combustion, could someday produce a significant amount of additional oil which America will need in the years ahead.

EXXON

Photographs by Kjell B. Sandved
Text by Lewis L. Deitz

Mild-mannered minimonsters

Treehoppers don't really leap much, but many of them show some of the most elaborate and mystifying shapes in the natural world

No family of insects is more varied, more magnificent or more outrageous in form than the treehoppers. Seldom does nature work so insistently without an obvious motive.

Like their relatives—leafhoppers, spittlebugs, cicadas, aphids and scale insects—most of the treehoppers that one encounters in the United States are fairly ordinary-looking insects, the sort of things all but a naturalist or an orchard owner would very likely overlook. But move south towards the tropics and these insects become an array of elaborate monstrosities. They remain, in essence, the same humble insects, but carry around on their backs extravagant structures, the purposes of which are by no means clear to scientists.

Most insects have a simple shield that tautly cloaks a narrow body region between the head and the front wings. This shield is called the pronotum. Among the

Shown six times natural size, armada of gaily colored treehoppers and young suck sap from a slender twig. These are *Umbonia crassicornis* of Florida. In tropics, treehopperdom is a phantasmagoria of shapes.

treehoppers, called Membracidae by entomologists, the pronotum explodes into a riotous assortment of sculptures and colors. The species shown above from Florida has a vividly colored pronotum that juts up like a spike. A related species from the Amazon region, *Umbonia spinosa,* has both the guise and the capabilities of a sharp thorn. An account published more than a hundred years ago relates that during certain seasons, hundreds of these insects fell from the "*inga* trees" with the result that walking barefoot was very painful for the Indians. Making the best of a bad situation, the Indians would roast and eat the fresh, flaccid adult insects before the spiny pronotum had time to harden and become a hazard.

Spikes are one thing. But among many species the superstructure covers the entire body or stretches far beyond it in one or more dimensions. Darwin wrote, "Nature, if I may be allowed to personify the natural preservation or survival of the fittest, cares nothing for appearances, except insofar as they are useful to any being." Yet all speculation on the function of the treehoppers' pronotum cannot explain adequately such fantastic modifications. The noted entomologist John Henry Comstock was prompted to declare, "Nature must have been in a joking mood when the treehoppers were developed. . . ."

The joke is an elaborate one: There are some 2,300 known species, ranging from an eighth of an inch to a "giant" called *Hemikytpha* which is nearly an inch long and bears two large horns that protrude over its head. Treehoppers are found in all parts of the world except the frigid Arctic and Antarctic areas, but the most diverse (and the most bizarre) occur in the tropics of the New World.

The members of one subfamily often resemble bits of twigs, bark, seeds or other plant parts. The genus

Mild-mannered minimonsters

Membracis has its pronotum compressed bilaterally, giving the insect the shape of a leaf. Species of the genus *Sphongophorus* are characteristically blistered, gnarled and twisted like nightmarish twigs or galls; one of these species has the crusty likeness of a gingerbread man. Another subfamily is so weird we might expect them to appear only at Halloween. One form sports a gracefully curved horn, like a hood ornament; another (middle picture at left on p. 68) carries a kind of parasol studded with knobs and spines. The members of a very large subfamily (called Smilinae) may look like flies, beetles or other insects, parts of plants or even toothpicks.

One astonishing genus is *Cyphonia*, aggregations of which may be mistaken for ants attending a cluster of aphids—in this group the treehoppers' pronota resembles the ants and the wings resemble the aphids.

Generally less active than their name suggests, the treehoppers leap only to begin flight—and they seldom fly (indeed, many seem hardly to be engineered for flight). Some are said to refuse to move if disturbed while with their young. For the most part they seem to spend their lives in sunny locations, leisurely sipping the juicy streams that flow through their preferred species of plant. This, of course, can damage the plant, but most injury to plants occurs when the females lay their eggs, slitting the plant tissue and depositing the eggs inside in much the same manner as cicadas. Such damage, which is particularly common on fruit trees, eventually scars and weakens the twigs and opens the way for diseases and attack by other insects. The feeding habits of a few species cause girdling of stems on leguminous crops.

In the United States most species overwinter as eggs; during the spring and early summer, the tiny hopperlings hatch out, wingless, with a small pronotum and usually quite spiny. Between egg and adult, the hoppers pass through five immature stages, each stage being slightly larger than the previous one. It is only after the final transformation that they produce wings and the pronotum characteristic of their species.

During their life cycle, some treehoppers change host plants; they deposit eggs on one type of plant and feed on another type. Some are solitary; many others are gregarious, with adults and offspring living as families. Occasionally, great numbers line up in rows on

Lewis Deitz is a treehopper specialist at North Carolina State University. Mr. Sandved is at the National Museum of Natural History.

A Peruvian species of *Heteronotus* carries large berry-shaped appendage behind like a child's balloon.

Emphusis bakeri from Mindanao perches on edge of a flower like an outlandish sign of the zodiac.

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Like a hood ornament for a flashy car, *Sphongophorus gonzaloi,* a Mexican species, rests upon a flower.

Brazilian treehopper, of the genus *Bocydium,* is unquestionably a front-runner for Most Bizarre award.

a stem, facing the same direction. No one knows why.

Certain ants milk an excretion from the treehoppers for food. An ant will stroke a hopper with its antennae, inducing the hopper to exude a drop of clear liquid honeydew from its anal tube. This is so common a relationship that the presence of either ants or membracids on vegetation often implies the presence of the other. In Brazil there are bees that milk treehoppers, while in Africa and Borneo butterflies accomplish the same thing by tickling the hoppers with their proboscises. In the case of one Brazilian treehopper, bees milk by day and ants milk by night. There are brief respites at dusk and dawn so the day shift never meets the night shift. Other species are milked by both ants and butterflies. This is not necessarily a one-way street. Attending ants may afford the hoppers certain benefits. Some ants build shelters of fiber or earth over their membracid "cows." Not only do the ants housecleaning by removing the honeydew, but an intruder is apt to feel the bite of a ferocious ant.

Nevertheless, treehoppers have many foes and few means of defense. Freeloading mites often attach themselves to immature and adult hoppers. Certain tiny wasps develop as parasites inside treehopper eggs. After the hoppers hatch, additional parasites enter the scene. One, a dryinid wasp, grasps her victim and deposits an egg in its abdomen; then, adding insult to injury, she snacks on a drop of honeydew exuded by the hopper during the struggle. The single wasp egg eventually yields 40 or more larvae in the hopper and one result is that the host's sexual development is retarded, causing male hoppers to assume the appearance of females. Ultimately, the wasp larvae devour the hopper, leaving only an empty shell.

Many treehoppers are gregarious, including these two Amazonian members of genus *Membracis.*

Sphongophorus hoffmanni, described in 1940, live on gnarled twigs, resembling piece of pre-Columbian art.

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Other natural enemies (the predators) include spiders, mantids, toads and birds. In addition, robber flies and sphecid wasps sweep down and carry off both immature and adult hoppers. Many of the sphecid wasps prey only on treehoppers, paralyzing them with their sting and storing the helpless insects in subterranean nests as provision for their young. In West Africa, carnivorous caterpillars hunt treehoppers and ultimately become butterflies, which in some cases milk honeydew from the same species of treehoppers that they formerly ate.

Not all the enemies of the treehoppers are animals. Certain insectivorous plants have cup-shaped leaves partially filled with digestive juices. Treehoppers, along with many other insects, sometimes stray into these pitcher traps, ultimately becoming a source of nitrogen for the plants.

In a world so rife with danger, the treehoppers have little to offer by way of defense—except perhaps their pronota, and this brings us back to the question: Why all this outlandish structure? The survival value of the hopper's pronotum has long been the subject of speculation. Because many hoppers resemble other insects or plant parts, some of the strange forms can be explained as protective mimicry camouflage (where one animal looks like a less tasty one, for example). Indeed the predominant colors among treehoppers—browns and greens—blend well with their environment. Yet many other species, because of their bright color or odd form, are conspicuous in their natural surroundings. Some spiny-shaped ones, for instance, are found on spineless plants. Maybe predators avoid such throat-threatening shapes; however, bird stomachs have been found to contain the spiniest of hoppers along with other more obviously palatable ones.

It has been suggested that the more grotesque pronota may even hinder flight or other activities, which would hardly seem to confer survival value on them, but perhaps the genetic mechanisms which control the inheritance of pronotal form also control the inheritance of other unrelated characteristics of the hoppers. Thus, the possession of a grotesque pronotum may be genetically linked to the presence of some more vital feature. Nevertheless, Darwin contended that only an advantageous variation would survive, while "variation in the least degree injurious would be rigidly destroyed."

There are other suggestions. In many species the pronotum covers the wings when the insect is at rest, protecting the wings just as modified forewings in a highly successful insect group, the beetles, protect their functional hindwings.

Recently Dr. T. K. Wood of Wilmington College in Ohio suggested that the pronotum is sensory in function. He discovered minute sensory hairs, sometimes detectable only with an electron microscope, on the pronota of all the treehoppers he examined. Wood consequently speculated that the great expansion of the pronotum provides a large surface area and orientation for the multitude of sensory hairs.

There is one case in which we are fairly certain of its function. In the genus *Anchistrotus,* the pronotum is so enormous that it would appear to be a hindrance to its owner. When seized by a predator, however, most of the balloonlike superstructure breaks off along a precise line, freeing the hopper to buzz away. But this means of escape can be used only once because the insect cannot grow another pronotum. So yet another question is added to so many others about treehoppers: How does a nude *Anchistrotus* fare without its awkward ornament? Nobody knows.

Like monsters in a science-fiction movie, an *Umbonia* species (left) confronts a *Sphongophorus* species.

The bright colors of sharp-spined *Umbonia* from Peru (about 12 times life size) may be a warning signal.

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Courtesy of the White House

Portrait of Frances Anne Kemble, painted
by Thomas Sully, now hangs in the White House.

By Robert Wernick

Glamorous actress found no glamor in Georgia slavery

Fanny Kemble despised her pampered life on an antebellum plantation and turned into a persuasive anti-Confederate in England

Probably the first literary description of the islands along the Georgia coast comes from Oliver Goldsmith, who often dined with General Oglethorpe, the founder of the colony, and must have heard his dismal tales:

> *Those blazing suns that dart a downward ray,*
> *And fiercely shed intolerable day;*
> *Those matted woods where birds forget to sing,*
> *But silent bats in drowsy clusters cling;*
> *Those poisonous fields with rank luxuriance crown'd,*
> *Where the dark scorpion gathers death around:*
> *Where at each step the stranger fears to wake*
> *The rattling terrors of the vengeful snake;*
> *Where crouching tigers wait their hapless prey,*
> *And savage men, more murderous still than they:*
> *While oft in whirls the mad tornado flies,*
> *Mingling the ravaged landscape with the skies.*
>
> ("The Deserted Village," 1770)

Sixty years later, another British writer was on the spot, and this land of darkness had turned bright. The landscape was now all glory: "the saffron brightness of morning, the blue intense brilliancy of noon, the golden splendor and the rosy softness of sunset . . . . the variety of the fresh, newborn foliage, the fragrance of the sweet, wild perfumes. . . . Honeysuckles twine round every tree; the ground is covered with a low, white-blossomed shrub more fragrant than lilies of the valley."

Thus wrote Mrs. Pierce Butler, better known as Frances Anne Kemble, the most famous Shakespearean actress of her day. She had married the owner of two large plantations in the islands.

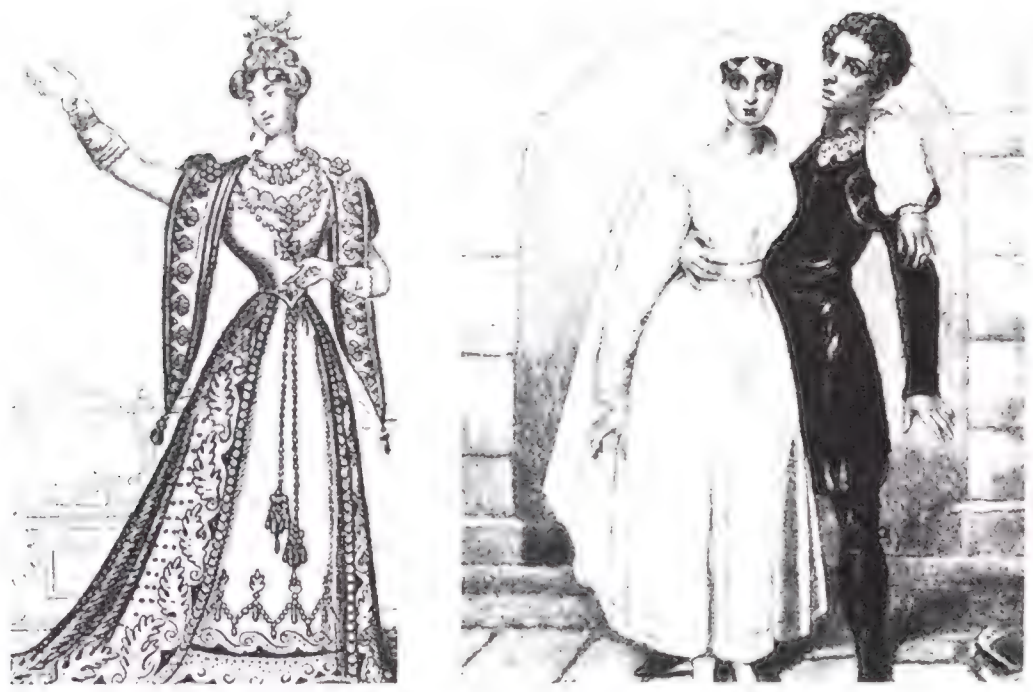
Her diary records going out on her stallion Montreal, galloping past ancient oaks hung with moss ("gigantic Druid ghosts with flowing robes and beards"), drinking in the delicious wildwood smells along paths "covered with a thick and close embroidery of creeping moss, or rather lichens of the most vivid green and red: the latter made my horse's path look as if it was edged with an exquisite pattern of coral; it was like a thing in a fairy tale. . . . I sat there on my horse in a sort of dream of enchantment, looking, listening, and inhaling the delicious atmosphere. . . ."

Alas, there was a serpent in this paradise. All the pleasures of Fanny Kemble's life there were built on the unpaid labor of some 700 blacks, involuntary servants, who were kept in an "abject condition," bought and sold and treated like animals; all "to support an idle young man and his family, i.e., myself and my children."

She had come to America for the first time in 1832, aged 23, with her actor father, Charles, who had gone into debt in London but was now launching what turned out to be a fantastically successful tour of American theaters. A niece of Mrs. Siddons, one of the great English actresses of all time, Fanny was a stunning success from her debut as Juliet at 19. Her fame preceded her to America, and grew with each performance. Everyone with an aspiration to culture fought to get tickets to see her as Portia or Lady Teazle, as Juliet, as Julia in *The Hunchback,* a play that had been written for her, or in *Francis the First,* a play she had written herself. Young and old were enchanted. Daniel Webster and John Marshall praised her. Walt Whitman was a boy when he saw her, and was to write later: "Fanny Kemble! Name to conjure up great mimic scenes withal—perhaps the greatest! . . . She came to give America that young maturity and roseate power in all their noon, or rather forenoon, flush." The crowds were record-breaking.

But she was unhappy about "that dreadful America," which kept her away from literary and artistic friends in London and about being on the stage in the first place. She had always hated the makeshift insecurity of the actor's life, the squalor of rented lodgings, the duns and bailiffs, the tawdry reality which made such an ironic contrast with the grandeur of the roles she played. She loved poetry, the spoken word, and she hated the ignoble forms in which they had to be presented to the lowbrow public: slapstick, acrobatics and vulgar farce to fill out every bill, happy endings tacked on to Shakespeare's tragedies. She longed for a more

Mr. Wernick has written on a great tapestry exhibit and a medieval chapel for SMITHSONIAN.



Prints of Fanny depict her in favorite roles. From left: as Portia in *The Merchant of Venice*;

decorous life. But she had no independent income, so it was back every night to the paint and the crowd.

Into her life there now stepped a handsome, rich, well-bred young stage-door Johnny named Pierce Mease Butler. He was born Butler Mease, the son of a Philadelphia merchant, but he had changed his name because that was the condition for inheriting a share of the estate of his maternal grandfather, Major Pierce Butler, once of the British army, who had married an heiress in South Carolina.

Like all the young bloods of Philadelphia, young Pierce was smitten with Fanny. He was more persistent than the rest, and he also had more money with which to follow her around.

She made a pilgrimage to Niagara Falls with her father, her dear Aunt Adelaide ("Aunt Dall"), Butler and the dashing Edward Trelawny, world traveler and adventurer, with the scar on his cheek and his ring of elephant's hair (the friend of Byron, the man who had burned Shelley's body on the beach at Viareggio). It was a wonderfully romantic excursion. The Falls were thrilling, young Butler was charming. On the way back their carriage overturned near Rochester, and Aunt Dall hurt her back badly. She died some months later of complications from the injury, and Fanny found herself distraught and lonely in a strange land. Pierce Butler was on his knees, offering his hand and his heart, comfort, security. One day she said yes.

Her friends were appalled. What was a brilliant young actress, an accomplished playwright and poet, who mingled with men like Trelawny, Walter Scott, Tom Moore, Lord Melbourne, Sir Thomas Lawrence, doing with a provincial booby? Charles Greville, the diarist, described him as "weak, dawdling, ignorant, violent-tempered." He was perhaps unjust. Pierce Butler seems to have been a perfectly conventional upper-class Philadelphian, polite, reserved, mildly cultivated —he played the flute and could read several languages —quite stuffy, quite unaware of any world other than the comfortable one into which he had been born.

Butler was naturally proud of his catch. He assumed that things would go on as they did in other respectable Philadelphia families. Wild and giddy young girls, after the raptures of the honeymoon, settled down to become proper and submissive wives. He could not understand why Fanny seemed to be taking so long.

They quarreled and made up, quarreled and made up. She wrote him tear-stained notes, he told her all would be well if she would only control her temper and submit her will to his. She agreed that her temper was her greatest fault, but she also wrote: "I cannot give my conscience into the keeping of another human being or submit the actions dictated by my conscience to their will."

In the interminable account of their marriage which Butler later had printed to justify his role in their divorce, he wrote, quite accurately: "One reason, and perhaps the fundamental one, for the ill success which attended my marriage, will readily be found in the peculiar views which were entertained by Mrs. Butler on the subject of marriage. . . . She held that marriage should be companionship on equal terms . . . and that at no time has one partner a right to control the other."

They remained together long enough to have two daughters, and in 1838 Fanny went down to Georgia with Butler to the plantations he had inherited there, and wrote her page of American history.

There were two plantations: Butler Island, in the estuary of the Altamaha River near what was then the busy port of Darien, and Hampton plantation on what is known as Butler Point, the northwest

as Juliet with Romeo, then with dagger and vial;
as Belvidera in Thomas Otway's *Venice Preserved*;
as Sheridan's heroine, Isabella, and finally, as
Mrs. Beverly in *The Gamester* by Thomas Moore.

corner of St. Simons Island, about 15 miles (by boat) eastward. Butler Island was a swamp which had been turned into a vast rice paddy surrounded by dikes, so that at high tide it was at a lower level than the surrounding water. Despite the magnolias, and the orange trees that grew for miles along the levee, and the little canoe *Dolphin* in which she could spend hours under the "unspeakable glories of these Southern heavens," Fanny found this flat, featureless spot depressing. Hampton was something else again, hacked out of the wilderness by old Major Butler and turned into thriving cotton fields. He had made a fortune for the family here, for he was one of the first to produce the long-staple Sea Island cotton which commanded premium prices through the early years of the century. Aaron Burr, who took refuge at Hampton after his duel with Hamilton, wrote of it delightedly as a land flowing with more than milk and honey: "cream and butter; turkeys, fowls, kids, pigs, geese, and mutton; fish, of course, in abundance. Of figs, peaches, and melons there are yet a few. Oranges and pomegranates just begin to be eatable."

By Fanny's time the mills of England were turning to short-staple cotton from the mainland, and hard times were on the horizon, though no one in 1838 knew how hard they were to be. The plantation, which had been run with military precision and kept spanking clean in the Major's day, was badly run down after nearly 20 years of absentee management. The old main house was ramshackle, the gardens overgrown.

While Pierce made a stab at running the place, Fanny was alone most of the time with her small daughters and her maid (white—a phenomenon the slaves could not comprehend; they seemed to think she must be some kind of subsidiary wife), and a variegated population of house servants and field hands speaking a language she could barely understand. She kept a diary, which was published years later under the title *Journal of a Residence on a Georgian Plantation,* a minor classic of American literature and prime source material for students of slavery.

She was not a trained observer, she loved romantic hyperbole and had little understanding of economics or politics. She was unabashedly one-sided and prejudiced. She was an English liberal-intellectual lady in backwoods America, appalled as much by the "stupid sameness of [the Southern women's] most vapid existence" as by their accent, that "thick and inelegant pronunciation which distinguishes their utterances from the Northern snuffle." Nevertheless, her account is invaluable.

No one brought up on the tradition of Southern plantation houses full of elegant ladies and dashing gentlemen, surrounded by magnolias and crooning darkies, can help feeling shock on reading Fanny's observations. Idleness and squalor are the dominant impressions. The house at Hampton, typical of the planters' houses she saw, "had all the appearance of an old, half-decayed, rattling farmhouse." The people who lived in such houses passed isolated listless days. The women were idle, sickly, with no occupation but gossip. The men, with a few exceptions like her nearest neighbor, Mr. Couper, were brutal, splendidly trained for a war or the slave revolt they all lived in terror of, but in ordinary times "they occupied themselves with furious feuds . . . and despotic cruelty."

These people imported fine clothes at outrageous prices, dressed up their house slaves in rags and scraps

Nature is reclaiming the ruins of the slave hospital at Butler Point, on St. Simon's Island,

of livery and pretended they were living lives of aristocratic ease. Her cold Londoner's eye was not taken in: "Young gentlemen in gay guard chains and fine attire played the gallants to me, while filthy, barefooted, half-naked Negro women brought in refreshments, and stood all the while fanning the cake, and sweetmeats, and their young masters, as if they had been all the same sort of stuff."

She couldn't identify the cuts of meat that appeared on the dining table until she discovered that the animals were carved up by the plantation carpenter, who hacked or sawed them into "so many thick square pieces . . . the consequence of this is, that *four lumps* or *chunks* are all that a whole sheep ever furnishes. . . ."

What tore at her heart was the condition of the slaves. Probably she really had not known of "these dreadful possessions"; or, if she had, she might have felt only a distant intellectual disapproval. She was not sentimental about the slaves who waited on her hand and foot and smothered her with their boisterous affection. She found them provokingly stupid, dirty and inefficient. But, unlike her husband, she did not accept all this as a law of nature. She blamed it on a deliberate policy of degradation which succeeded all too well: The slaves at Hampton would not even cook a meal without specific orders.

Everything about the system revolted her: the sight of pregnant women being herded off to work in the fields, the casual way the white overseer took black women to father his bastards (she noticed several young mulattoes who unmistakably had his features), the filthy neglect of the building called a hospital (above) where half-naked creatures lay groaning on the ground as they died or gave birth, the way families could be casually broken up, a husband or wife or child sold off to an upcountry plantation. And she was horrified by the way the system made use of its own victims to run itself. On all this vast plantation there had been for years no white people permanently resident except the overseer and his son. All the taskmasters who drove the field hands out every morning, and who hung them by the wrists from branches to flog them if they were troublesome, were black.

She was a woman and all she was expected to do was let a swarm of chattering, devoted, ineffectual servants take care of her. The servants were her husband's property, with which she had no right to tamper.

Being Fanny Kemble, she did what she could—cleaned up the hospital, gave lessons in personal hygiene, made mothers bathe their babies. She listened when the women came to her with their troubles. A local historian of the traditional school later said, "She caused quite a disturbance among the slaves by listening to their small complaints." They complained to her of being driven out to work in the fields three weeks after childbirth; they complained of twisted backs and fallen wombs; they complained of being whipped after they had complained to her.

She kept coming to her husband with requests and remonstrances until he finally blew up. "Why do you listen to such stuff? . . . Don't you know the niggers are all d—d liars?" He forbade her to speak to him any further on the subject. When they were safely back in Philadelphia after nearly four months on the planta-

which Fanny visited. It was constructed of tabby, a cement made of sand and lime-rich shells.

Portrait of Pierce Butler hints at a proper Philadelphia background—quite unlike Fanny's.

tions, he made sure that she would never go back.

Fanny kept her journal locked away for 24 years. She felt that she might be interfering with her husband's property if she published it. But by the winter of 1862 she was in England, and England was in danger of being involved in the Civil War raging in the States. The government and *The Times* and a good part of the upper class were strongly pro-Southern in their sympathies, and tempted to use the fleet to break Mr. Lincoln's blockade. Fanny felt called upon to do what she could to sway English public opinion to the side of freedom. In May 1863 her journal was published, and it had a considerable success. Just how considerable, no one can tell today, for the records of her publisher were destroyed in a World War II blitz. If Lincoln could call Harriet Beecher Stowe a little lady who started a great war, may we not call Fanny one who helped prevent it from getting greater? People in Georgia seem to think so to this day, and you can still hear dark mutterings among the elders that "Fanny Kemble lost the war for us."

By 1862, Fanny had left Georgia and Pierce Butler far behind. Their total incompatibility, cruelly revealed in Georgia, only got worse in Philadelphia. They had drifted into a long, messy and sensational divorce. Pierce got custody of the daughters, and was evidently a good father to them—they were devoted to him all the rest of his life. But he never forgave Fanny for her "peculiar and impractical" opinions.

Fanny herself went back to the stage—"the consummation of a long career of error," said Pierce. Her latter career was even more glorious than her first. She found a more congenial way of playing Shakespeare—she gave public readings in which she was no longer bound by the conventions of the theater. Her fire, her sensitivity, her understanding were acclaimed.

She mingled again in the society of the famous, on both sides of the Atlantic: with Thackeray, Carlyle, Browning, Tennyson; with Emerson, Holmes, Hawthorne, Agassiz. When Chief Justice Story of Massachusetts was asked how he could reconcile his enthusiasm for theater and Fanny Kemble with the teachings of his Puritan ancestors, he replied: "I don't try to reconcile it. I only thank God I am alive in the same era with such a woman."

The girl who had sat at Walter Scott's feet when the 19th century was young had Henry James sitting at hers when it grew old. Her favorite grandchild was Owen Wister, author of *The Virginian*, which may reappear on television throughout this century.

She became quite a character in her latter days, noted for her tart tongue. Once she was seated at dinner next to a famous and eloquent clergyman. "A very fine day, Mrs. Kemble," he said by way of starting a

conversation. "I should have expected a less commonplace remark from the great Dean of Christchurch," she replied. They dined in silence.

She lived on into her eighties, when the girl who had written half a century before that "the death I should prefer would be to break my neck off the back of my horse at full gallop on a fine day" had to content herself with sitting on hotel balconies in Switzerland, gazing at the mountains she had loved to climb.

While Fanny was thus walking the heights of fame all through the last half of the century, the Georgia plantations she had loved and hated went into a long decline. The market for long-staple cotton got worse and the panic of 1857 finished it off. Butler had to sell his slaves—some 400 men, women and children.

Then came war and emancipation. The islands were occupied and looted by Union forces, and the planters who came back were ruined. Pierce Butler came down with daughter Frances, or Fan, from Philadelphia and tried to get the weed-choked fields back into operation. Many of the old slaves were there to greet them, including some of those who had been sold in 1859, but who came back to what they still thought of as home. Perhaps, as Fan wrote in her memoirs, they remembered the Butler plantation as a happy place compared to what they had seen since.

Fan had none of her mother's feelings about the blacks. She was fond of them but, like her father, regarded them as improvident, childish, chuckleheaded things. They couldn't make sense of a wage economy, they complained and protested for the fun of it, they put on airs and took time off for voting and other frivolities, and the long and short of it was that the Butler plantations were doomed, even without the plagues of insects and hurricanes. Pierce Butler died, but Fan had her mother's fire and ran things herself for a while. She married an English clergyman, J.W. Leigh, the son of a lord, who loyally chipped in and tried to help her. Despite years of hard work, there was little success, and the Leighs eventually went back to England. Like most of the Sea Islands, the Butler plantations gradually reverted to jungle.

Butler Island eventually came into the hands of one Colonel Tillinghast L'hommedieu Huston, part owner of the New York Yankees in the 1920s, who turned it into a model iceberg-lettuce farm, using some of old Major Butler's irrigation system. It later was bought by a tobacco-rich Reynolds; in 1954 the state of Georgia made it into a wild-bird preserve.

Butler Point has been almost untouched by human hand since the departure of the Leighs; it is a tangled wilderness not unlike what it was in Oglethorpe's day. It will probably not remain so long. The Sea Islands began a new career in 1886 when a group of rich men from the North, noticing that the climate in these parts, once you can control the mosquitoes, is one of the most pleasant on Earth, formed the Jekyll Island Club. Its membership, composed of Morgans, Vanderbilts, Fields, Goulds, Rockefellers, Pulitzers, Goodyears and such, was indeed rumored to represent one-seventh of the total wealth of the United States. They formed a kind of millionaires' ghetto which flourished until World War II.

In the 1930s the luxury resort of Sea Island was opened across a narrow inlet from St. Simons, offering to favored vacationers all the elegance and comfort which Fanny so sorely missed in Georgia. St. Simons is a prosperous community today, the population has come back to what it was in the 1850s, but the click of golfballs has replaced the crack of overseers' whips.

A New Jersey company owns Butler Point and may someday develop it with golf courses and expensive homes offering glorious views of ocean and forest and marsh. But for the moment nothing disturbs the dark quiet. The birds that Fanny Kemble loved to hear still flash their bright wings and sing in the branches. Vast tangled tracts of live oak, palmetto and pine cover the land, although the Spanish moss which gave the druidical impression noted by Fanny has been largely killed off by fumes from the pulp mills in Brunswick across the water. Poking through the dense underbrush you can make out some tabby walls belonging to various outhouses of the old plantation. The main house has disappeared without trace. Deer scud through the trackless woods. The vengeful snake still rattles in the underbrush.

So popular was Fanny Kemble that her portrait could be "dressed" with prints of various costumes. At top center she is gowned as Mary Stuart.

By Irene Kiefer

Earth boils below while we scratch the surface for fuel

Geothermal prospectors track down hot spots in the Earth's crust that can be tapped for 'free' heat to enhance our electric power

Two years before the Gold Rush turned San Francisco into a boomtown, a surveyor and explorer, William Bell Elliott, was charting the mountainous country north of that city. When he came across a valley from which great jets of steam were erupting, he thought he had reached the gates of hell.

Instead, Elliott had stumbled upon one of the Earth's visible reminders that the planet was born billions of years ago in a long, drawn-out agony of compression—and heat. And in the same valley, called the Geysers, one can today see one of the few visible signs of a new heyday for a different breed of prospectors. They are far more sophisticated than the rabble that made up the forty-niners and they seek not gold but the Earth's primordial heat—geothermal energy.

What struck Elliott as infernal strikes a fuel-short nation as a little bit of salvation. We are scrambling around the Earth looking for things to burn in our power plants while beneath our feet lies 8,000 miles of molten rock that in some places is so close to the top that it turns groundwater into steam. Federal energy officials estimate that tapping the Earth's heat to produce electricity could supply a useful percentage of the nation's electricity needs by the year 1985.

The steam in the Geysers results when water, trapped about 1,000 feet below the surface, is heated by hot porous rock—a "hot spot" in the Earth's crust. Because of the high pressures at those depths, the water remains liquid, though it is at about 375 degrees F, far above its normal boiling point at the sur-

Not the gates of hell, although the surveyor who discovered it thought he was close, this is

Geysers, California, where steam from the Earth is used to generate 396 megawatts of electricity.

face. As the water escapes, rising upward through a natural vent or a man-made well, the pressure drops and the water flashes into dry, super-heated steam. What, from the standpoint of producing electricity, could be simpler?

Steam is what drives most of the electricity-producing turbine generators in this country. Ordinarily, to make steam means mining fuel, processing it, transporting it, burning it, disposing of its wastes. It means high-pressure boilers, pipelines, strip-mining, nuclear power, and a host of widespread, associated environmental ills—all to get a reliable head of steam. And there, in the Geysers, was steam for the taking. Simple as it sounds, however, the first attempts to harness the Geysers failed. In 1922 drillers tapped the steam source, but the corrosive and abrasive effects of impurities proved too much for their piping and turbines. In the mid-Fifties, two small companies, Magma Power and Thermal Power, teamed up to prospect and drill on leases they had acquired in the Geysers area. One of the first times Magma-Thermal hit the steam vault, they failed to cap the well quickly enough and the pressure blew out the top of a hill.

They soon improved their engineering techniques while new stainless steel alloys licked the corrosion problem. By 1960, Pacific Gas and Electric was generating 11 megawatts (11,000 kilowatts) of power with steam purchased from Magma-Thermal. In 1965, the small company joined forces with Union Oil of California to get needed capital for more drilling and today PG&E generates 396 megawatts from 100 wells—some of them 8,000 feet deep. By 1977, capacity will be up to 908 megawatts.

Though it is the world's largest geothermal power plant, the Geysers can now supply the needs of a city of only 400,000. Its continued production after almost 15 years, however, is a shot in the arm for the hopes of developers of geothermal energy. First, it indicates that a geothermal reservoir can hold out long enough to warrant building expensive plants—and, with careful management, it may even last indefinitely. Second, since it is the only geothermal power plant completely owned and operated by private industry, there are no hidden subsidies to mask the true costs.

While it is the largest such plant in the world, the Geysers is also one of the few of its type possible. Dry steam fields are rare phenomena. One such field—at Larderello, south of Florence—is said to have inspired Dante's visions of inferno. The first dry steam field to be exploited commercially, the Larderello plant has been in operation since 1904 and is still going strong, generating 380 megawatts of electricity. A 30-megawatt plant started up in Japan in 1961, but has recently failed. The only other dry steam fields known that might have commercial possibilities are in the Monte Amiata region of Italy.

With so few dry steam fields known, attention has turned to hot spots that produce a mixture of steam and hot water—known as wet steam—at the Earth's surface; the most spectacular example is Yellowstone National Park. While wet steam fields are more common than dry ones, power production is more complicated, since the water (as much as 90 percent by weight) with its dissolved minerals must be removed

Red squares on this map are producing geothermal fields, yellow squares are potential fields, and red areas warrant further exploration. Black dots are geothermal wells and green are test wells.

As the Geysers field was developed, an intricate network of pipes was fashioned to lead steam from the wells to the generating plant. An early well, badly capped, blew off the top of a hill.

before the steam can be fed to the turbine that drives the generator.

The first power plant to use wet steam was built in the early 1950s when New Zealand, short on conventional sources of power, turned to developing its great geyser area at Wairakei. Mexico followed suit in the early 1970s with a small plant in the southern extension of Imperial Valley. Attempts just north of the border in California's Salton Sea area of the valley, however, ran into geothermal fluids containing so much dissolved minerals—as much as 25 percent—that they corroded and clogged turbines and sometimes even the wells themselves.

Temperatures in most wet steam fields are only in the 100 to 200 degrees F range, not hot enough for power production by the conventional means used in the 600 degrees F (and up) fields of New Zealand and Mexico. (Of course, even lower-temperature steam fields have been used for heating homes in such places as Iceland, Siberia, Klamath Falls, Oregon, and Boise, Idaho. New Zealand uses geothermal steam in papermaking and it has agricultural applications in Japan.) To make steam power from lower-temperature fluids, their heat is used to boil a liquid with a lower boiling point—Freon, for example—which in turn drives the turbine and the generator.

Another approach is to force the rapidly expanding hot water-steam mixture from the wellhead through nozzles, then use the high velocity mixture to drive turbines similar to those used in hydroelectric plants.

The hot spots where steam fields, as well as dry, hot rock, are found occur where molten rock from deep in the Earth's interior has welled up into the crust. Generally, these geothermal reservoirs are localized in areas of earthquake and volcanic activity. One geothermal belt runs down through the entire Western United States. In late 1970, the U.S. Geological Survey classified about 1.8 million acres in eight Western states and Alaska as Known Geothermal Resource Areas (KGRAs) and 95 million acres as Potential Geothermal Resource Areas (PGRAs).

The Geothermal Steam Act of 1970 called for leasing of these public lands, and, in December 1973, after delays in the preparation of the Environmental Impact Statements, the Interior Department gave the go-ahead for the leasing of all PGRA lands and 50,000 acres of KGRA lands.

Almost 60 bids were received on the KGRA lands, which the law requires be leased competitively. Most of the high bidders were major oil companies. Looking for a few hundred applications on the PGRA lands,

Earlier in SMITHSONIAN, *Irene Kiefer wrote on bioluminescence and chemical evolution.*

At a Mexican plant residual hot water, too filled with minerals to be used, is shunted to ponds.

which merely require payment of a $50 filing fee, the Interior Department was flooded with 2,500. The total is now more than 4,000.

Leading the way in the geothermal rush is a new breed of entrepreneur—excited by what he sees as a new era of exploration and undeterred by what many others see as a very chancy business. The skills and capital needed effectively rule out the lone prospector. Instead, small companies are formed by a few men who combine the skills and experience required by modern geothermal prospecting.

A typical company—although perhaps a bit stronger professionally than some others—is American Geothermal Resources, a publicly owned company incorporated in Nevada in 1971. President of the company is Roy Parodi, a financial expert for 20 years at Magma Power. Vice President is William D'Eloier, with 20 years of experience in subsurface geology and well drilling for several oil companies in the West. Rounding out the professional staff of four are a drilling expert and a land broker experienced in acquiring leases.

American Geothermal has been exploring 60,000 acres of private lands it leases in Nevada and California. (It has also applied for almost 20,000 acres of federal lands, the maximum allowed under federal leasing regulations.) The search starts in the technical literature and files of government land offices, to identify geologic formations showing evidence of recent volcanic activity. These are likeliest to have hot rock at shallow depths.

American Geothermal has identified several sites on its land as promising targets for drilling experimental wells. But with $100,000 to $150,000 invested per site, even the experienced American Geothermal has had to find new capital before it can drill a well. After approaching several companies, it formed a partnership with Chevron Oil Co. (a subsidiary of Standard Oil of California) to drill its first well, in Nevada's Beowawe geothermal area.

Finding geothermal resources is as much a problem as developing them. Exploration techniques are not much past the stage of those used to find oil a hundred years ago: looking for evidence on the surface. In making its classifications, the Geological Survey examined the limited information available from drilling for oil and gas, but primarily it looked at areas where surface thermal activity has been observed, then defined specific areas on the basis of existing geological and geophysical evidence.

A young geologist from Southern Methodist University has demonstrated the shortcomings of relying entirely on surface evidence. David Blackwell was studying heat-flow patterns in the Pacific Northwest in the summer of 1969. His research took him to the abandoned gold-mining camp of Marysville, 20 miles northwest of Helena, Montana. There, in the course of taking the temperature of old wells, he recorded the highest thermal gradient ever found in the United States. On the average, the temperature of the Earth goes up one degree for every 100 feet one goes down.

A drilling rig probes for the hot rocks indicated by geological surveys in Marysville, Montana.

At a depth of just a few hundred feet, Blackwell found the temperature rising more than ten degrees every 100 feet, suggesting that at depths readily accessible to drilling technology the temperature could be as high as 800 degrees F.

At the time of Blackwell's discovery, Marysville was not classified as having even potential geothermal value because there are no hot springs within 20 miles. The geology of the area indicates that a buried reservoir of hot water is unlikely. The source of the heat, Blackwell now believes, is a tear-shaped mass of hot, dry, impermeable rock. Some 10,000 to 80,000 years ago, volcanic activity pushed the then molten rock up through a fault to within a few thousand feet of the surface. The hot rock, largely under public lands, covers an area of about 12 square miles.

The Marysville discovery opens up the possibility of geothermal resources far greater than those involving wet or dry steam. Studies in the West have outlined three broad regions of high heat flow, but these have never been studied in detail. Similar regions are known in many other parts of the world. Blackwell thinks that an inexpensive way to explore for "blind" geothermal reservoirs would be to measure the temperature in all existing drill holes more than 100 feet deep.

Getting the energy out of hot dry rock would involve drilling two wells. Cold water would be pumped in under pressure to crack the rock, as is done now in developing oil fields; the rock could also be cracked by explosives. Water would then be circulated down one well, through the rock to be heated and up the second well. After the heat was extracted, the cooled water would be sent down the first well again.

Much of the technology needed to do this probably exists, but it has never been tested. Among the many questions to be answered: Will the water pick up large amounts of minerals? Will a substantial portion of the water be lost underground, raising costs, as well as the possibility of earth movement? If hot water can successfully be brought to the surface, will its cost be in line with competing energy sources?

Almost as many questions need answering with regard to geopressurized brines, a fourth major type of geothermal resource. In many regions of the world, the Earth's heat has been trapped in water in deep beds of highly porous sands beneath impermeable clay that

acts as an insulating layer. Pressures in these reservoirs are abnormally high. Drillers exploring for oil have encountered vast geopressurized reservoirs all along the northern shore of the Gulf of Mexico. These reservoirs are bundles of energy—their temperature is as high as 550 degrees F; they are saturated with natural gas and their high pressure can be converted to mechanical energy. But development would probably be very expensive—in part because the wells would have to be at least two miles deep—and risky as well. Very little is known about the size of the reservoirs or if they would last long enough to justify building plants.

Geothermal energy is, indeed, a risky business, and despite the entrepreneurial, rugged-individualist flavor of some of its practitioners, the federal government's expanding role in research and development is necessary to hasten the availability of kilowatts from the Earth's heat.

Only a couple of years ago, the U.S. Geological Survey's budget for research on geothermal resources was $200,000. The National Science Foundation, the agency recently designated to lead and coordinate federal geothermal efforts, didn't even have an identifiable geothermal research budget until 1972. The administration's budget request for fiscal year 1975 earmarks $45 million for geothermal research. While hardly a major commitment in an energy research and development budget totaling $1.8 billion, it is a large increase.

Much of the current effort is aimed at locating the nation's geothermal resources and determining how big they are. Work is also getting under way to acquire some practical experience in managing geothermal reservoirs and generating geothermal power. According to Ritchie Coryell, manager of the National Science Foundation's geothermal program, plans call for building a number of experimental power plants. Facilities might later be added to one of the proposed plants to study nonelectrical uses of geothermal energy, including fresh-water production and mineral extraction as well as residential heating and greenhouse agriculture. The plants and their associated reservoirs would be open to industry to test new hardware and engineering techniques.

Experimental plants will also be needed to study geopressurized brines and hot rocks. The Atomic Energy Commission is already drilling into hot rock in New Mexico and a well drilled last summer at Marysville may lead to an experimental plant there. As a result of the exploration at Marysville, funded by the National Science Foundation, Coryell has already had to field questions on possible damage to the environment from development of geothermal resources. The land where the well is being drilled should suffer a minimum of disruption, however, and, fortunately, the site is located on the other side of a hill from the town of Marysville itself, one of Montana's major ghost-town attractions.

In general, the environmental hazards from geothermal development center around its visual impact on the land. Most geothermal areas are sparsely populated; any kind of industry in such places could reduce the land's recreational and esthetic values. Many wells must be drilled to develop a geothermal field, so relatively large acreages would be affected. It is also possible that large-scale withdrawal of geothermal fluids might lead to earthquakes and land sinking. Geothermal areas are found, after all, in seismically active parts of the country. But re-injecting fluids into the wells, as is done in oil fields, could minimize the danger while helping to recharge the reservoir and dispose of waste liquids.

A third problem has an old, familiar ring: Geothermal wells do release sulfur dioxide, the same pollutant we associate with coal-burning power plants.

It is a business of unknowns, but the geothermal rush is on. California is buzzing with activity. In the Imperial Valley, one even sees an occasional car with a "Think Geothermal" bumper sticker. And, while few are as bullish as the geothermal entrepreneurs, many experts—Coryell among them—look for geothermal power plants to be generating 20,000 to 30,000 megawatts by 1985. This would represent only 5 to 10 percent of present U.S. capacity, to be sure, but would still be a huge jump from the 396 megawatts now generated from what first looked like the gates of hell.

Engineers check steam wells undergoing pressure tests at the Geysers. Some geothermal areas are used to produce fresh water and minerals as well as heat.

By Timothy Green

Best-selling vet practices as usual

His second book (All Things Bright and Beautiful) *is out, but James 'Herriot' still makes night house calls in Yorkshire*

Dr. Herriot and his wife relax with their dogs behind their unpretentious house in Yorkshire.

The front door of the old Georgian house is standing wide open and the yelping of a dog comes echoing down the passageway from somewhere inside. No one answers the bell, so I venture in and find a large, sparsely furnished office where several people are all talking at once. A pretty bright-eyed girl in a white coat is reading off a list of farm addresses from a desk diary. A bearded young man, also clad in a white coat, is carefully explaining to a lady clutching a sad little terrier, "The only cure, Mrs. Brown, is if we operate, but you must realize 16 is a terrific age and it's only a 50-50 chance that he'll survive."

A tall, thin man is energetically complaining to anyone listening that with beef prices falling the way they are, the farmers are really being punished. And on the telephone, a short, well-built man with sandy hair just graying at the edges, is saying very firmly that he will come by at 11 o'clock to give the calves their brucellosis shots, and please be waiting. He hangs up and says cheerfully, "He's got me at every turn. I say I'll come at 10, but he says 'No, I'm going to look at the corn.' So I say how about 12? And he says 'No, the men will be at lunch.' "

The scene is probably familiar to the millions of followers of James Herriot, the British veterinarian from the Yorkshire Dales. His book *All Creatures Great and Small,* about his adventures as a country vet in rural Britain of the 1930s, got off to a modest start there, but very much to his surprise, the big breakthrough has come in the United States. It has sold more than 120,000 in hard cover and some 1.1 million in paperback. And the Herriot saga is continued in *All Things Bright and Beautiful,* recently published with a first printing of 100,000 copies. The difference, of course, is that this is the real office of James Herriot, country vet, in a small Yorkshire market town, in the summer of 1974. That is Herriot, now 57, doing battle on the phone with the farmer, while Siegfried Farnon, still his energetic partner after more than 30 years, is the chap holding forth on the farmers' plight.

Actually Herriot is not the literary vet's real name; Siegfried Farnon is a pseudonym, too. Even Darrowby, the town in the Dales where they practice, is a composite of two communities. Such secrecy is required by British veterinary etiquette, which does not permit any form of advertising—and being the author of a best seller might be construed that way.

Mr. Green's subjects for SMITHSONIAN *have included Gerald Durrell and the Pheasant Trust.*

Not that anyone up in the Dales is fooled by the Herriot *nom de plume*. He did keep it quiet for a while until, as he puts it, "someone blew the gaff," and soon everyone knew. A two-year waiting list for the book built up at the local lending library, while hardy old farmers, who hadn't read a book since they left school at the age of 12, actually bought copies on market day. And the postman delivers to his surgery the hundreds of fan letters addressed variously, "James Herriot, COUNTRY VET, Darrowby, England." Still, the front of anonymity helps preserve the niceties of the thing, and serves also to keep at bay the fans, especially from America, who scour Yorkshire trying to track him down. Any vet in the Dales nowadays is likely to find an eager American, amid the usual clutter of cats, dogs and guinea pigs, demanding to know if he is really their veterinary hero. A few, of course, get their man; a deputy sheriff from Oregon turned up in Herriot's surgery recently requesting the famous vet's autograph.

Herriot displays almost boyish delight at his sudden fame and fortune. "I'm on a gorgeous wicket," he says cheerfully. "No one had thought of writing funny books about cows and pigs before. And it's nice to make people laugh."

Being a literary lion comes second, however, to the serious business of working in his country practice. This morning there are four farms to be visited, plus a home call to an old lady who is too lame to bring her sick cat to the surgery. So Herriot, casually got up in a blue shirt, brown tie, heavy-knit blue cardigan and fawn cavalry twill trousers, heads his car out of town and up into the hills. I sit in the back of the car, because two dogs, a huge black Labrador named Don, and Hector, a Jack Russell terrier, have total command of the front passenger seat. "I hope you don't mind," says Herriot, in the gentle Glaswegian burr that has scarcely diminished 30 years after forsaking Scotland for Yorkshire, "but the dogs come everywhere with me."

Lucky to get the offer

Herriot himself never expected to be a country vet. He grew up in the bustle of Glasgow, where his parents were both professional musicians. When he qualified he thought he would settle down to what the professional calls "small animal" practice in the city, doctoring sick cats and dogs. But in the late 1930s jobs were scarce and, he says, "I was lucky to get this offer in Yorkshire."

And Yorkshire proved a delight. "I'd spent all my weekends when I was young camping in the Scottish hills, and I thought there was no scenery outside Scotland," he recalled. "So I got a pleasant surprise at all

Wearing the raincoat and boots that are standard garb for an operation, the doctor leaves a barn.

Photographs by Paul S. Conklin

Dr. Herriot and his assistant, "Siegfried," check the latter's dog, Sam, which had had inflamed gums.

this." He waves his arm to the hills, crisscrossed by ranks of gray stone walls, where the heather is in full bloom. "I can always forget my troubles by getting in the car and driving through the dales to the farms," he goes on. "Karl Marx said religion is the opium of the people; work is my opiate."

The first work today is to inoculate some young calves. We pull up in the yard before an old stone farmhouse. Herriot opens up the trunk of his car to reveal boxes upon boxes of syringes, and bottles crammed with all kinds of drugs. He dons a black oilskin coat and rubber boots. "I've got steel-tipped toes in the boots," he says, "because cows like nothing better than standing on your feet."

The farm foreman greets us with the news, "Kept a cow in s'morning, she's bad in her wind, a bit like me." Herriot promises to see her once the calves are done. They are all frisking about in a small stall, and we begin a game of tag to try to catch each in turn. Eventually the foreman gets a rope on one and hauls it to him. "Hold his nose, please," Herriot instructs, moving in swiftly to toss the needle into the calf's neck. In ten minutes all are done, and we go on to see the bronchial heifer. "Did she have pneumonia as a calf?" he inquires, as he slides a thermometer up her rectum. The foreman is not sure.

"Let's push her round, so I can listen to her heart," Herriot suggests, as he puts a stethoscope to his ears. Together they tug and shove the unwilling cow. "Em, her heart's all right, but she's wheezy and bronchial. I'll give her a shot of cortisone and Terramycin." He whacks the injection into the muscle of the cow's rump with a swift backhand throw that would do credit to a darts champion. "You've got to bash it in quickly," he says, as he leans over to hook in the syringe, "no good going it slowly. I know if someone was injecting my backside I'd want it good and hard."

He washes down his boots with a hose, and scrubs his hands in the dairy, and we pile into the car for the next call. "I kept telling my wife for 25 years that I was going to write a book," he says, as we set off down a winding lane, "but she didn't think I would. Then one day she said to me 'We had our silver wedding last week, and you're 50, you'll never do it now.' So I thought, okay mate, I will and I got started." He began typing tentatively before the television set in the evenings (which his family preferred to previous efforts to teach himself to play the violin). Half the time his literary beginnings were interrupted by phone calls to dash out and attend a sick animal, but he stuck with it for a year and a half, a few minutes here, half an hour there. "Being called out so often gave me a nervous frustration which helped me write," he says. It took him months to work out the right style.

"When I started I tried to write beautifully balanced sentences like Macaulay's Essays," he remembers, "but I soon realized that was no good. So I got rid of most of my adjectives and high-flown prose and thought how I would tell the tale in a country pub."

He is, in fact, a natural storyteller, but getting it down on paper, rather than recounting it over a glass of ale, was still not easy. "What was it Robert Louis Stevenson wrote?" he asks. " 'I hate to write, but I love to have written.' It's a real sweat for me to get it down, but I love correcting and improving what I've written." Because healing animals takes priority over writing, he has that rare advantage that few professional writers enjoy of being able to leave something and

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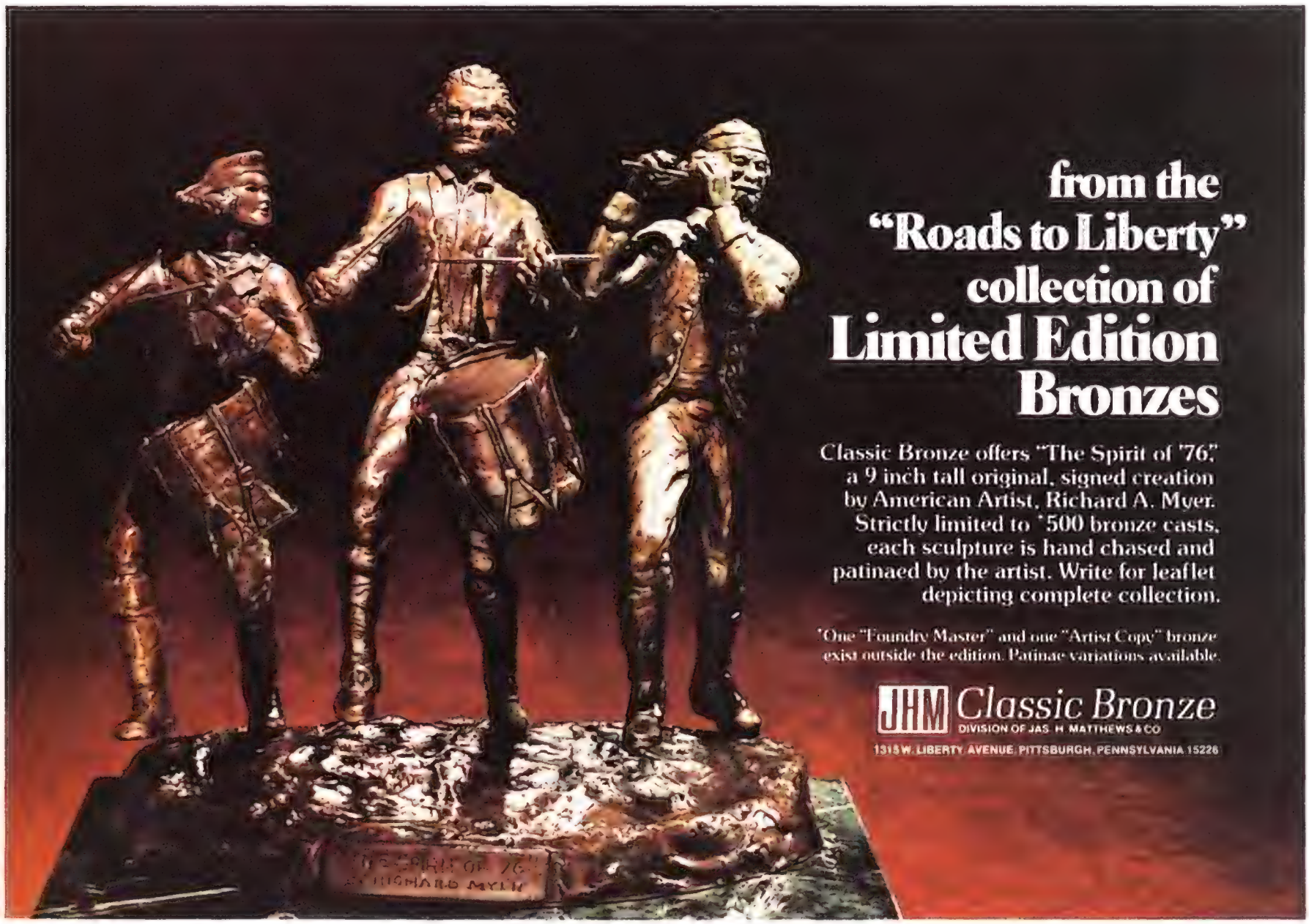
come back to it again, perhaps days or even weeks later, with a fresh eye. He is modest about the finished result. "Nothing important has ever happened to me," he says; "my life is merely the framework for a series of animal incidents."

As for the *nom de plume* James Herriot, that is actually the name of a goalkeeper on a football team that he was viewing on TV one evening as he pecked at his typewriter. Watching football is his great relaxation and he has season tickets for two local professional teams (not that he can get to games very frequently, because he still has only every other weekend off duty). Having chosen Herriot, he now finds that real people of that name write to him from all over the world. "They say, 'You are the image of great-uncle Marmaduke in the family album,' " he chuckles. " 'What branch of the family are you?' "

By now we have pulled up, high on the moor, beside some windswept farm cottages. "It's a rough place to live," he remarks. "They have to drop food by helicopter sometimes in the winter. I've got a little preventive medicine to do here—give a pony an antitetanus injection." We find a note pinned to the door of the cottage. It says: "To the vet. Sorry no one at home, pony in box next to blacksmith's shop, halter on door, if you can't manage alone Mr. Scurs will help you. Pony quite [sic]. Thank you." There's no sign of Mr. Scurs, so Herriot asks me, "How are you with horses?" Two minutes later I am hanging onto the head of a little dapple gray pony, as he firmly thrusts the needle into its neck. "You should have been here on Wednesday," he says, as we return to the car, "I did a Caesarean on a cow, you could have handed me the needles and sutures. The Caesarean is still the $64,000 job. You've really got to go into the guts and get the calf out."

He decides to pop over to see how the cow is recovering from the operation. Mother and calf are both striding happily around a pen in a large barn. The cow does not seem at all troubled by an 18-inch-long incision in her side, which is healing nicely. Herriot rounds up a couple of farmhands and we try to corner her so that he can give her a postoperative injection. But with some fancy footwork she dodges around four of us, and is out of the open gate of the pen racing down the barn. "My motto," says Herriot, as a posse of farmhands rush to recapture her, "is 'if you can't catch the patient, don't worry.' " So he leaves the farmer the drug, advising "give her ten milligrams a day when you can get near her. She's recovering fine."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He is pleased the operation has been such a success. "When you save the mother *and* get a live calf from a Caesar, it's very, very nice."

Presently he stops the car by an open stretch of moor. "Mind if we take the dogs for a ten-minute stroll? I always do that in mid-morning instead of a coffee break." As the dogs gallop ahead, our recent encounter with the reluctant patient reminds him that being a veterinarian is not a genteel profession. "It can be rough and dirty," he says, "and the accident rate is high. In the old days with lots of horses, it used to be really tough, because if a horse kicks you it can mean a broken leg. My daughter Rosemary was mad keen to be a country vet, but I talked her out of it, so she's a doctor instead, which is the next best thing. Both the children used to come out in the car with me all the time once they were two years old. My wife hardly saw them. They'd put their big boots on and off we'd go. Rosemary would open the gates and get my bottles out of the boot [trunk]. She knew every one

The doctor prepares an injection for a sow with mastitis. The charge for a visit includes drugs.

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of them. When she had to go to school at five, she was worried how I'd manage without her. 'Never mind, Dad,' she said, 'I'll be with you on Saturdays.' "

His books, of course, have not yet taken the tale that far. "Maybe it was cunning in me that made me write only about one year of my life at a time," he says. "I've got years and years to go yet." His second saga, *All Things Bright and Beautiful,* covers only the first year or two of his marriage and ends with his setting off to the war. "Siegfried and I both joined up as air crew in the Royal Air Force," he explains, "because the army wouldn't take vets early in the war. We'd have liked the Veterinary Corps, but they wouldn't have us then. Tristan [his brother] was the lucky one; he waited and later went straight into the Vet Corps as a captain, while Siegfried and I stayed where we were, second-class aircraftsmen trudging round the barracks square."

But daydreams of veterinary escapades in the Dales enlivened such footslogging, and will form the theme

Dr. Herriot, with the help of a hired hand, checks a pig on which he operated to correct a rupture.

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of the third book he is now writing. The postwar years, which brought a revolution in animal care, with improved drugs like penicillin and large animal surgery, are a rich reservoir as yet untapped. "I was the first vet in this part of Yorkshire to go in for large animal surgery," he recalls. "The farmers were amazed. 'What? Take calf owt cow's side, lad?' " Nowadays, just to make sure his fund of anecdotes doesn't dry up, he carefully writes down the best incidents as they happen. The first books, however, have been entirely from memory. While some people believe he must have made up such hilarious goings on, he insists it is quite the contrary. "I've played down lots of anecdotes," he says. "What happens with animals is unbelievable."

The spectacular reception of his literary efforts has proved both a delight and a worry to him. What to do with all the money? He could flee from the Dales to some tax haven for a few years as it all flows in. "But how could I do that," he asks, "what would happen to my dogs? They'd die if I went away." As it is, he has bought few luxuries. Just a fine hi-fi set for himself and a snappy yellow small sports car for his wife. Their only real ambition is to spend some of the money to build a nice new bungalow in the Dales to replace the modest townhouse where they have lived for 30 years.

Fame is as big a headache as wealth. When he went on a U. S. tour to promote his book, he visited Michigan State's veterinary school at East Lansing. "They treated me like royalty," he says. "Deans and professors came round with me, you'd have thought I was the greatest veterinary surgeon in the world." Now veterinary schools from Cornell to Oklahoma write asking him to come and address their graduation ceremonies. They want to laud him for bringing new dignity and status to their profession. He replies, regretfully, that he cannot come. He explains that he is just a country vet with a practice to keep going. He could, of course, give it up and spend all his time writing and lecturing. But, as his wife said as we sat chatting in the evening, "This success has come too late in life to change us; 20 years ago perhaps he might have given up being a vet, but not now."

And Herriot himself put down his glass of ale to chip in, "I wouldn't give up being a vet if I had a million pounds. I'm too fond of animals. And to me driving round the Dales, especially if it's sunny and I'm in my shirtsleeves with the car roof open, is like a paid holiday."

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When zebra stallions fight, usually over a filly, they generally try to bite rather than kick as horses do.

By Richard D. Estes

Zebras offer clues to the way wild horses once lived

The stallion at right will lie still until attacker stops biting his leg, then get up and resume battle.

Animal behavior studies show stallions fight over fillies, but not the mares, in each other's remarkably stable families

Horses are very familiar, and yet we know very little about how they lived as wild animals. They were never studied behaviorally, and now it is almost too late to study truly wild horses rather than the merely feral ones, such as roam parts of the American West. Even the feral populations are dwindling, and with them the possibility of observation in the wild.

Other recent members of the horse family are still with us, but most are rapidly fading. Both the wild ass, from which donkeys and jackasses descend, and the onager of Central Asia are endangered species. That leaves the three species of zebra, of which two have very restricted ranges. Perhaps 10,000 mountain zebras survive in southwestern Africa, and 10,000 or more Grévy's zebras still range locally in northern Kenya and adjacent parts of Somalia and Ethiopia.

But there is one member of the horse family which still thrives in the wild in numbers approaching its former abundance, and it may give us some clues to the way horses lived when they were wild animals. Half a million plains or Burchell's zebras inhabit the savanna country from northern South Africa to the southern Sudan. Moving in their annual migrations along with wildebeests and other grazers (SMITHSONIAN, August 1971), herds of zebras may stretch as far as the eye can see across the grasslands.

Their social organization is unusual among mammals—stallions, the dominant animals, possess movable property rather than territory—and it is shared only by mountain zebras and, possibly, horses. The plains zebras live in stable families, or harems, of mares and foals, with each family of 6 to 16 members controlled and defended (mostly from other males) by one stallion. Large troops of zebras are made up of these units, plus bachelor herds mainly consisting of immature stallions.

Their social behavior was studied by the German ethologist Hans Klingel and his wife Ute over a three-year period, largely in Ngorongoro Crater in Tanzania. I happened to be living there at the time, studying wildebeests, and we became friends. This article is based on their findings, published primarily in German. Most of the displays described for the zebras are recognizable in all members of the horse family; also, zebra behavior may tell us how horses, including extinct species formerly in North America, once lived.

The plains zebra is the size of a Welsh pony. Males stand 12 to 14 hands (48 to 55 inches) at the shoulder, and weigh up to 700 pounds. Females are almost as tall, but 50 pounds lighter. The zebra is a grazer and more water-dependent than such plains animals as the wildebeests, gazelles and other antelope with which it often associates.

Zebras and wildebeests both move to and from pastures daily, trekking single file along narrow game paths that meander and crisscross the plains, converging on water holes and stream fords. Both species seek areas of short grass to bed down for the night; concentrations numbering in the thousands gather on Ngorongoro's central plains in late afternoon. They rest and sleep most of the night, although at least one herd member is always on its feet.

Associate curator and chairman of mammalogy at Philadelphia's Academy of Natural Sciences, Estes, a Ph.D., is finishing work on a three-volume handbook on the behavior of African mammals.

Shortly after sunrise the herds become active and begin moving to their feeding grounds. Most of the day is spent grazing, in social activities, and in moving to and from pastures, water, rubbing rocks and rolling places. They rest only briefly, generally in the early afternoon. As with all wildlife, however, the activity cycle is influenced by the weather: Zebras get up later and move less on cold, rainy days.

Although generally quiet, zebras can be very noisy when disturbed or on the move in large bands. The loudest and most frequently heard cry sounds like something between a bark and a bray; the Hottentot name, *quagga* (pronounced *kwacha* in Afrikaans), represents this sound. It maintains or reestablishes contact between herd members.

A quiet call often heard in a concentration of grazing animals is blowing with loose lips, exactly like a horse. It is a sound of contentment or well-being. The opposite is the short squeal emitted when a zebra is bitten or kicked, or simply afraid. There are two alarm calls: a snort, the nearly universal alarm call of hoofed animals, and a hoarse, open-mouthed breathing in and out, a quiet cry. Foals have their own distress call, a drawn-out squeal which alarms the herd and instantly brings the stallion and mother to its defense.

A good deal of time is spent in grooming. Zebras like to rub themselves on large rocks and tree trunks, embankments, termite mounds or other objects of the right height, which are apt to be scarce on the plains. They will wait in line, if necessary, for a chance to rub their necks, sides, rumps and bellies. Aside from warthogs and elephants, few other savanna animals appear to have the rubbing habit.

Polished rubbing rocks with tracks around them are still to be seen on the South African High Veld, where herds of *quagga*—a zebralike animal that was either a subspecies of the plains zebra or a species in its own right—lived until they were exterminated in the 19th century. Today even most local residents have no idea of what kind of animal left these memorials.

Confirmed dust bathers, zebras are indebted to wildebeests for their stamping grounds of bare earth. Wildebeests, too, like to roll, but cannot roll completely over as a zebra (or a horse) can. The secret may lie in having a rounded back—plains zebras always seem to look round and fat.

Even more important in zebra behavior than rolling and rubbing is social grooming, a mutual activity which seems to cement relationships between members of a stallion's herd. Two zebras stand face to face and nibble (not lick) one another's neck and back with their incisors, removing dead skin and loose hair. When they have finished one side, each animal, as if on signal, takes one step backwards, swings its head to

Zebras wear deep ruts in the ground around a rock or other object on which they can rub themselves.

Like horses, zebras like to roll in dust, here on a patch of ground

the partner's opposite side and resumes currying. All the members of a herd groom one another, but mares groom most often with their offspring, especially the latest one, while adult females are paired least often. The stallion prefers to groom some mares more than others, without regard to social rank, and apparently with no sexual overtones. Zebras do not groom with strangers; when a new mare is introduced to a herd, at first only the stallion, her sponsor, will groom her.

Grooming behavior is fully developed in foals only a few days old, an indication that socialization begins very young. Like others who have handled zebras, I found that orphaned foals and even older individuals responded almost immediately to being curried and became really tame within a few days. This response, based on social grooming, a fundamental equine trait, may well have a bearing on the original domestication of the horse and ass, and the unusual tolerance of these animals toward being handled.

Plains zebras are highly nomadic and migratory, emancipated from the attachment to a narrow home range that is typical of most ungulates. Instead of real estate, the stallion controls mares—movable rather than fixed property. Each family and bachelor herd is a self-sufficient unit; there is no higher social organization, although shared food preferences often bring herds together on the same pastures. There may also be some social attraction, or enhanced sense of security, that draws herds together.

Every zebra belongs to a herd, except for perhaps 20 percent of the bachelors, these being mostly young adults. Any zebra seen completely on its own is virtually certain to be one of these unattached stallions, or a crippled or diseased animal that has fallen too far behind.

The family group is a closed matriarchy in which the senior mare is usually the top-ranking female and second only to the family stallion. She, however, is the real leader; the stallion normally brings up the rear and concerns himself chiefly with preventing any members from straggling. When moving single file to pasture or water, the rest of the herd members take their places between these two dominant individuals, each mare in strict order of precedence, followed at heel by her immature offspring, also in order, with the youngest first and the oldest last.

Most adult females apparently remain with a particular family group for their lifetimes. Sick and old animals are allowed to remain in the herd and are actually sought by the stallion if they become separated. Even if something happens to the stallion, the herd does not break up; another stallion takes it over. Of 41 families that were watched in Ngorongoro Crater for two years, 29 kept the same complement of adults and only six lost any adult mares. A total of seven mares disappeared, and probably died. Only one adult mare joined another family. Five herds changed stallions, in three cases when the stallion died and in only two when a very old animal was replaced. Such stable herd organization is unusual among hoofed animals; it is not found, for instance, among the Grévy's zebra or the wild ass.

While the adults were stable, the young were just the opposite. During the same two years, 40 fillies departed from 26 families, 28 young males left 22 families, and 17 fillies were added to 12 families. Thus inbreeding and increase in herd size are both averted.

In other species, separation of the young is usually brought about by hostility on the part of the dominant male or the mother, but this is not the case in the plains zebra. Outside stallions abduct fillies when they reach the age of one to two-and-a-half years, despite

stamped bare by wildebeests. Being round and fat helps in rolling.

Mutual grooming gives the zebra a tolerance to handling comparable to that of domestic horses.

the best efforts of the herd stallion—who is usually their father—to defend them. A conspicuous posture maintained by fillies for more than a week when they are in heat attracts stallions from far and wide—the Klingels once saw 18 around one herd. The outside stallions try to cut these fillies out of the herd for themselves. The herd stallion will fight for hours to prevent this. Remarkably, *adult* females perform this display for only a very short time at the height of estrus, and rarely attract the notice of outside stallions. Here then is a special behavioral mechanism that functions one way in mares to preserve the family unit and another in fillies to prevent inbreeding.

Serious fights between zebras are almost invariably over a filly in heat, and usually involve either young adults trying to start a harem or herd stallions bent on adding another female to their families. Few outside stallions will stand up to the herd stallion; nevertheless, he is kept busy by males trying to get into the herd and cut out a filly. While he is chasing one of these males, others take advantage of the opportunity and sooner or later—sometimes after days of turmoil—one will succeed in driving a filly so far from her family that her father can no longer overtake them. Ironically, the abductor usually loses her in turn—either at once or when she again comes into heat.

Fillies normally undergo a whole succession of estrous cycles at about three-week intervals, before finally conceiving when about two-and-a-half years old. Only then does a female cease to attract young males and become the property of one stallion. The newcomer receives a hostile reception from the other mares, however. Only after a probationary period, during which she is kept at a distance by bites and kicks, against which the herd stallion—not always successfully—tries to defend her, is she accepted.

The possession of mares, once established, is as a

Stallion that has just sniffed a mare's urine (left, head up and mouth open) is testing the scent

Bachelors leave their families at an early age to form their own herds, such as this. They

in a special smell organ which may identify breakdown products that signal onset of estrus.

will play-fight until they are strong enough to abduct fillies and start families of their own.

rule respected by all other zebras. Even if a mare in full estrus—potentially responsive to any adult male—is detected, the mere presence of the family stallion is usually sufficient to discourage interference. Judging from the incredible persistence and endurance displayed by herd stallions in defense of their daughters, this respect is fully deserved.

When zebras do fight, they generally bite rather than kick. Stallions have broad, spade-shaped canine teeth, capable of inflicting painful lacerations and crushing bites. Combatants often show blood stains after long bouts—which may continue intermittently for hours—but deep slash or puncture wounds seldom, if ever, result. Ears, neck, mane and legs are the main targets. Stallions rear, jostle and neck-wrestle while trying for an ear or mane hold. Seeking a grip on a leg, they drop to the ground and circle on their knees. Having once obtained a grip on the hock or carpal joint, a stallion holds on and grinds away. I have seen a family stallion caught in this situation apparently give up and lie still, possibly because of the pain, exhaustion or both. But he jumped up immediately and resumed the fight once he was released.

Some survive a broken leg

Plains zebra stallions seldom rear up and lash out with their forefeet as horses often do, but they sometimes unleash hard kicks of a hind leg (so do mares), which can break a leg or a jaw if they connect. It is not uncommon to see animals with broken legs; what is more surprising is that some of these animals survive despite the presence of more than 400 spotted hyenas in the Crater, which regularly hunt zebras. Occasionally one sees a perfectly healthy zebra with a foreleg that has set and healed at an odd angle. The lower jaw of one stallion was broken cleanly behind the incisors so that it flopped loose.

Generally, the families are stable, moving as a unit and banding together to protect their young. Although foals are born throughout the year, there is a definite birth peak during the long rains. In Ngorongoro, more than three-quarters of the foals are dropped from October to March, 60 percent of these in February and March. Females foal for the first time at about three-and-a-half years, after a one-year gestation period, and afterward produce one foal a year (virtually never twins). Like other equidae, zebra mares come into heat within a week or so of foaling (foal heat), and thereafter every three weeks to a month until impregnated.

The estrous period lasts from seven to ten days. Stallions detect onset of the cycle by smelling the female's urine, a routine which is automatically performed whenever a mare urinates. The stallion inhales the scent vigorously, then raises his head high with

upper lip curled and stands for many seconds as though transfixed, except for occasional movements of the lip when air is expired through the nostrils in short bursts. During this performance, known as *flehmen,* the urinary odors apparently are assayed in an accessory olfactory system known as the Jacobson's or vomeronasal organ, which is thought to be specialized to detect concentrations of sex hormones.

With the approach of estrus, the output of estrogen greatly increases and the breakdown products are excreted in the urine. Beyond a certain threshold, the concentration of estrogen triggers the male's sexual interest, usually well before the female is prepared to respond. Nevertheless, zebras (and other members of the horse family) urinate with particular frequency during estrus. Thus the stallion's interest is sustained even against active resistance on the part of the mare. He begins to follow and court her, sniffing her, rubbing his muzzle on her and nipping her. The female reacts by kicking him in the chest and withdrawing, sometimes running away a short distance with the stallion in pursuit. But at the same time—and throughout courtship—she displays the characteristic submissive expression known as *Rossigkeitsgesicht* (mare-in-heat-face). Far from discouraging him, the kicks seem further to stimulate the stallion, who soon starts to make periodic mounting attempts.

Once the mare is in full estrus, copulation occurs without further ado. Finished, the stallion slides off, moves away and begins to graze. Copulation is repeated at one- to three-hour intervals for about a day.

Sometimes other mares react jealously toward the courted one, particularly when it happens to be a low-ranking female. They threaten, bite and chase her out of the herd. The stallion does not try to fend them off, although his mere presence somewhat inhibits them.

That this long-continued and involved courtship behavior fails to attract the attention, much less lead to the interference, of other stallions is hard to understand. Apparently odors associated with estrus are only effective over a short distance. As long as a stallion is with the herd, other males keep their distance. When, as sometimes happens, the family stallion is absent a few minutes—for instance while "greeting" another herd stallion—a stranger may happen to approach, become aware of a mare in heat and start courting her. But no sooner does the herd stallion return than the outsider abandons the field.

The only part of the female's estrous behavior that attracts males from a distance is the posture adopted during full estrus. Unlike fillies, which maintain the pose for days, adult mares adopt it only when the family stallion approaches and mounts them. The stimulating effect of this posture was demonstrated experimentally and quite unexpectedly when the Klingels were immobilizing zebras with anesthetic darts. Under tranquilizing drugs, females not in heat adopted an estrouslike posture, resulting in the immediate approach of stallions from any nearby zebra herds.

A mare (with head down) rejects last year's offspring (left) in favor of the new foal at her side.

Births in the wild have rarely been observed. One witnessed by the Klingels took place within a few hundred yards of my camp. The mother lay flat on her side, watched over from a short distance by the stallion while the rest of the family grazed about 50 yards away. The foal was completely enclosed in a rather tough caul from which it extricated itself unassisted and gained its feet after 11 minutes. It took its first steps after 19 minutes, could walk well in 32, and broke into a canter after 44 minutes. This is very slow compared to a wildebeest, which may be on its feet and running within three minutes—but then wildebeest calves have only their mothers to protect them.

The zebra foal suckled 67 minutes after birth. Whenever the stallion and other herd members came near the foal for the first few days, the mother laid back her ears and chased them away. After that time her foal knew her apart from all the other zebras, whereas before it would follow any moving object.

When hyenas approach a herd with a young foal, the mother hides with it behind other family members. The whole herd cooperates to protect any threatened member, primarily by staying close together instead of bolting and leaving behind a weak or sick animal. The stallion actively defends his group and does not hesitate to attack hyenas and wild dogs. This defense is so effective that only hyenas hunting in sizable packs are likely to succeed in their attempts to single out vulnerable members of a herd.

The foals grow quickly. Fillies, as noted, may be taken by other stallions. Young males have been known to remain in the family until four-and-a-half years old without arousing the father's antagonism. But the urge to play, it seems, prompts most young stallions to depart the family group and join a bachelor herd as yearlings or two-year-olds, passing much of their time in play-fights and greeting games.

Bachelors generally attach themselves to an adult stallion. Groups may number from 2 to 15 head, and Klingel found small groups to be very stable, although no rank hierarchy was noted between adults. Males remain bachelors until at least five or six years old, for only then are they mature enough to hold their own in competition with older males. However, younger stallions may serve an apprenticeship as leader of a male herd. I have also known a pair of young stallions to adopt and protect an orphaned foal.

Unusual as it may be, this fairly complicated social organization works. The fact that the plains zebra is one of the most abundant and widespread African herbivores must be at least partly the result of the exceptionally effective protection afforded by its unusual family social organization. And that is the way it may have been among horses when they were wild.

Photographs by William Vandivert
Text by Rita Vandivert

A toy museum distills magic

Rescued and charmingly restored, this Victorian establishment is where you can purchase an unusual doll or watch a toy theater drama

Toy enthusiasts, fresh from an exciting tour of the museum, finish a visit to Pollock's

At an intersection in London's Soho district stand two tiny old houses side by side. They can claim to be the center of toy theater history, for they house a museum collection of children's toys from all over the world, plus a business in English toy theaters. The small rooms and narrow stairs are crammed with relics, a panorama of dolls and dolls' houses and other toys which have intrigued children for centuries.

Pollock's Toy Museum owes its existence to the energy of Mrs. Marguerite Fawdry. In 1955 her ten-year-old son John, a toy theater fan, posed a problem. He could no longer buy the wire slides on which he mounted his actors to manipulate them from behind the scenes. Mrs. Fawdry took up the trail of toy theater supplies and it eventually led her to the offices of the receivers who had taken over Benjamin Pollock, Limited, the last functioning toy theater venture. She learned that though there were probably 100,000 of those slides sitting in a warehouse, it was nobody's job to dig up a dozen for her. So she bought the lot and her Kensington house soon became a revived Pollock's toy shop. A year later she rented a house near Covent Garden, and the attic was converted into a toy theater shop which quickly took over the other floors, as well.

It was a success. Londoners loved it, visitors from other countries heard about it, and soon the shop was expanded into a museum—Pollock's Toy Museum—with exhibits from John's toy cupboard, treasures that the Fawdrys had collected on their travels, and gifts and loans from friends and well-wishers. In a few years the house was filled and the overflow had to be stored at the family's country place in Kent. In 1969, Pollock's Toy Museum moved again, this time to its present home in Soho, where its gaily painted exterior brightens a dingy street.

Toy theaters developed out of the practice of engraving souvenir "theatrical portraits" of famous actors and actresses in their popular roles. Theaters were copied in miniature and plays adapted from actual productions. An early surviving example, *Principal Characters in the Popular Pantomime of the Fairy of the Oak, or Harlequin's Regatta, As performed with unbounded applause at Astley's Amphitheatre,* included Pantaloon, Servant, Harlequin and Clown, and is dated 1811. Within a few years publishers were selling printed sheets of scenery and finally the book of words, which was a shortened version of the text of the play—a whole package to be hand-colored if bought "plain," then cut out, pasted on cardboard and set up to be performed behind a cardboard proscenium. There were exact replicas of Covent Garden or Drury

with a chance to spend some of Mummy's money at the toy shop. A young assistant shows them how.

Primary schoolchildren on a class visit file down the street to toy museum entrance.

Lane, complete with painted curtains, side boxes with ladies and gentlemen, and a row of musicians.

Throughout the 19th century a host of jobbing printers and stationers around London's theater area produced these prints and plays on hand presses. Drawings were made at opening nights, with changes of costume noted. From these prints Pollock's inherited its stock of original plates and engravings.

During the bombing of World War II, thousands of plates and prints were moved to a safer place before the shop was blitzed. Sporadic efforts were made to sort out these materials, open new premises and revive interest in the toy theater. A new company was formed, Benjamin Pollock, Limited, and some famous names lent authority and helped the enterprise. J.B. Priestley wrote a play, *The High Toby,* for toy theater production. Sir Ralph Richardson and Robert Donat were on the company's board of directors. But at last the venture ended up in the hands of the receivers. Now, once again, Pollock's is a going affair, this time with the Fawdrys in charge.

When you embark on the museum tour, the young person behind the counter tells you politely to go through the door behind you and down to the basement, then to start climbing and follow the arrows.

You start down two steep flights of narrow stairs and face a glass door. Behind it is seated a young girl, head bent, paintbrush in hand, busily transforming "Penny Plain" into "Twopence Coloured." She is an effigy of Miss Louise Pollock at about age ten, already helping in the family business. To your right, through another glass door, you see other wax figures engraving a copper plate or running a hand lithographic press.

Once you start climbing, your way is made colorful with each wall and window brightly decorated with prints, pictures and glass cases.

Up one more floor and you are in a roomful of antique toy theaters, all assembled, mostly behind glass.

When you can tear yourself away, mount two steep steps and pass through a somewhat less crowded room, its walls decorated with French dolls and Chinese shadow theaters made in Epinal, France. At the far side of the French room you can cross over to the house next door. Avert your eyes from the enticing staircase leading downwards, alive with color and with toys, and squeeze into a tiny room that contains street toys, lead soldiers and teddy bears. Through a glass door you can see an exhibit of a Victorian boy's nursery. He sits surrounded by toys, games and stuffed animals of the period.

Now you can return to the staircase and go down two short flights between walls lined with items from everywhere. From Russia, brightly painted wooden dolls with smaller versions inside them; carts and farm

The writer-photographer team of Rita and William Vandivert collaborated on the article about historical jigsaw puzzles in the August SMITHSONIAN.

London toy museum

Effigy of Louise Pollock, at the age of about ten, busily hand-colors a black-and-white print. She remained in the family business for years.

animals carved in the Austrian Tyrol; carved whistles, animals and dolls from the Italian Dolomites; toys from Bulgaria, Yugoslavia and Germany; a display of paintings from a Hungarian gypsy school; and an exhibit of ceramic whistles in the shape of strange birds and beasts which are still being made in the Soviet village of Dymkovo. There is another Victorian nursery, this time for a girl, packed with dolls.

If you have come to Pollock's with a sufficient supply of children and have made your visit known beforehand, there is a room on the top floor at No. 41 Whitfield Street which will be unlocked for you. It is another small room, and again no inch of space has been wasted. Against the windows are antique optical toys with resounding names like thaumatrope, stroboscope and zoetrope—devices made in Victorian days to create the illusion of movement. On the dark side of the room, surrounded by curtains, is a toy theater stage with just enough space behind the curtains for the operator to put on a performance.

One-man stage show

The proscenium, though less than 12 inches wide and 10 inches high, is a complete replica of an old London theater, and though the paper actors are barely three inches tall, the performance is packed with excitement. Barry Clark, the tall young man who usually sells you your ticket to the museum, is the impresario, a combination of lecturer, musician, a covey of stagehands and all the actors rolled into one.

After telling his audience about the origin of the play to be performed, Barry disappears behind the hangings and the curtain goes up. Gliding in from either side, the characters appear. The convention seems to be that the figure whose lines are being spoken is agitated gently by means of the wire slides to which it is attached. When silent, the characters stay still. They reveal their innocence or their villainy as the plot unfolds, all achieved single-handedly by Barry Clark, with music of fife and drum thrown in.

In the toy shop, as you leave the museum, you are faced with a display of softly lighted toy theaters assembled on shelves. You can buy them folded flat in book form with a cardboard proscenium, scenery, actors and the book of words. Then "a sharp knife and glue are required for cutting out and assembling." In "Penny Plain" you can buy *The Battle of Waterloo,* 1842 edition; *Othello* or *Richard III,* based on Edmund Kean's productions of around 1850; or a version of *Hamlet* based on Sir Laurence Olivier's 1947 film. In "Twopence Coloured" you will find a *Cinderella* package with a four-color 19th-century design of the theater, and words in English, French, German and Italian. You also get a reprint of Robert Louis Steven-

son's essay, *A Penny Plain and Twopence Coloured.*

The penny and twopence have, unfortunately, changed with the years. Plain now sells for 50 pence and colored for a pound (or, now, 100 pence).

Spread out all around the shelves of the shop, in baskets, glass jars, drawers and glass cases, are traditional and modern toys from all over the world. Chinese paper lanterns and festival garments hang next to toys from Germany, both East and West. There are figures from India, spinning tops from France and, among the English toys, the famous lead soldiers, still brightly uniformed and more expensive than ever.

The shop has Noah's Arks, flower presses and things that make animal noises. Pigeonholes contain items with which a child could furnish a town full of dolls' houses. The most costly items are well-equipped shops.

If you have fewer funds, you should gravitate toward another counter where, for five cents, you can buy a paper fish which will tell your fortune. Here, large glass candy jars are filled with tiny prehistoric animals, lavender dolls, balloons and "moon rocks."

On other shelves are books on dolls and dolls' houses, on toy theaters and puppets, as well as one whole shelf of Beatrix Potter's works in English, German, French, Italian, Latin and Welsh. This side of the business is operated separately and headed by Kenneth Fawdry whose principal concern is with the publishing of the plays. The museum itself is set up as an Educational Charitable Trust and is a nonprofit organization.

Girl's nursery display depicts Victorian times—
a doll in bath with hot-water can nearby.
The seated doll is wax, more than 100 years old.

Staircase is lined with toys, decorations
and costumes from countries all over the world.

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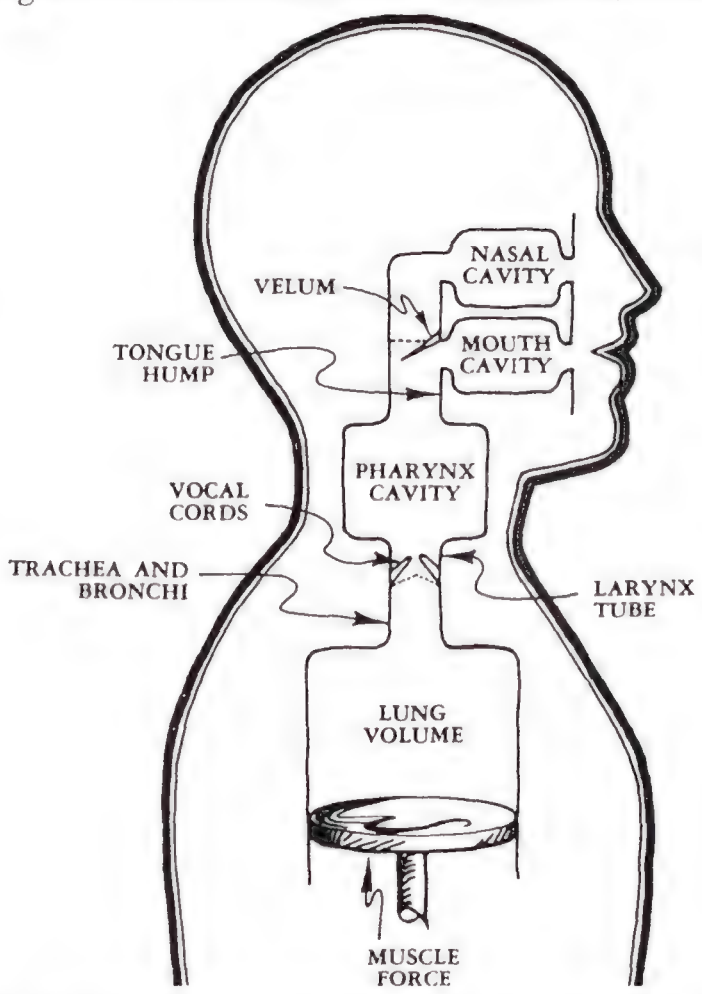
One solution is to use higher frequencies, even laser communications, and take advantage of the extra bandwidth. But the technology is expensive and, so far, it's developing gradually rather than explosively.

A possible interim solution is voice compression. It won't do a thing for CB fans yet, but it looks very promising for the telephone companies and government communication networks. Here's how it works.

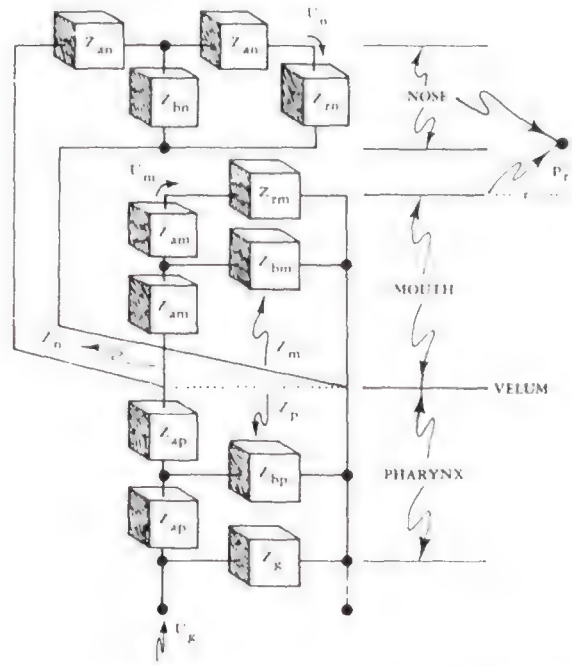
You first put the voice signals from a microphone through an electronic box that digitizes them. This simply means that each up or down step in the range of the speaking voice is turned into a set of ones and zeros, or data bits.



The human speech generation system consists of a bellows (the lungs) that pumps air past the vocal cords and through a series of resonating cavities (the pharynx, mouth, and nose). Nerve impulses regulate frequency and volume.

If you use a high data rate (i.e. divide the voice range into many, *small* up-and-down steps and sample them frequently) you get enough digital data at the receiving end to reconvert the digital signals into natural voice. If you compress the voice by using fewer, and therefore bigger, up-and-down steps (or by sampling the steps less frequently), you may get the *words* out at the other end but the speech has a flat quality.

The crucial problem, then, is how to conserve bandwidth by compressing the voice but still maintain good quality. The people in TRW's Voice Processing Lab have been remarkably successful in doing just that. With an unusual combination of linguistic and mathematical modeling skills, they're beginning to develop systems that will do the whole job automatically. With large-scale integrated circuit technology, plus volume production, costs may eventually be quite low, too.



Careful evaluation of the properties of human speech forms the basis for refinement of the basic algorithms (mathematical descriptions of the human speech system and its mechanical and electronic analogs) that enable programmers to compress the digital speech signals. TRW's multidisciplinary team is working with specialists in electronics to develop techniques that use relatively few data bits per unit of speech, yet preserve the natural quality of the voice.

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By Lawrence Fernsworth

Automobile comes to Tillamook

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The author's news career led him from Tillamook to the Times of London.

Drawings by Brenda Tilley

from Astoria once a week. The stagecoach made better time, taking only two days.

Tillamook County, on the Oregon coast, lies between mountains and sea, about 50 miles south of the Columbia River. In 1905 the town of Tillamook had about 900 people. It was the county seat and served as the metropolis for those who lived along the rivers and valleys and battled for salmon. Automobiles had appeared in what Tillamook folk called "the outside," but no one was sure how to pronounce them—whether to rhyme with "bill" or "bile" or "noble" or "beel." People said that no automobile could get into Tillamook County from the outside, anyway.

In 1905, a small coastal steamer called *Sue H. Elmore* made the trip down the coast from Astoria once a week—if the weather held. The stagecoach did even better, taking only two days to make it from outside, except when snow blocked the passes.

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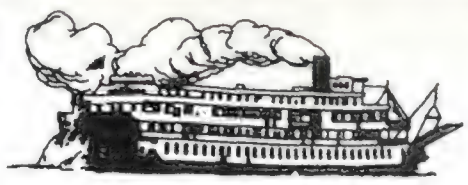

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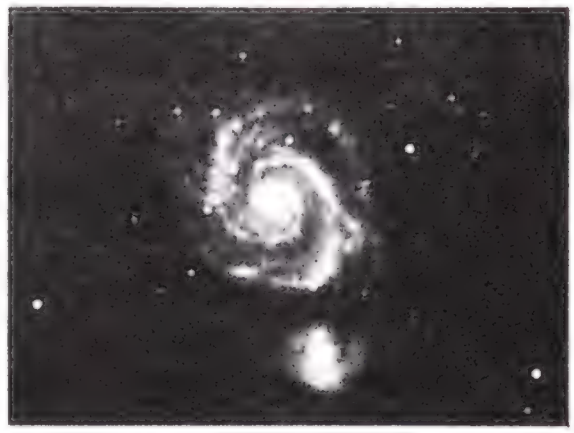

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first automobile arrived, introduced by Rollie Watson, editor of the *Tillamook Herald*, one of three weekly newspapers.

Rollie had served in the Navy and came to town, tattooed up to his neck, to start a new career. He bought the *Herald* from his uncle, R.M. Watson. Not long after, R.M. received a consignment of crates on the *Sue H. Elmore*. The town drayman, who was also chief of police, carted the crates to the back of a furniture store, and they turned out to contain a platen press that could be run by waterpower or foot pedal, a printshop stone, a planer and mallet, some iron forms and several cases of type. R.M. thus set up *The Independent*. Independent it was.

At each other's throats

In no time *The Independent* (editor R.M. Watson), the *Herald* (editor Rollie W. Watson) and the *Tillamook Headlight* (editor Fred C. Baker, a naturalized Englishman) were snapping at each other to the glee of the citizenry. People always gathered at the post office on the respective press days, Tuesdays, Thursdays and Saturdays, to read what R.M. and Rollie and Fred had to say. What Fred had to say about R.M. one week was that he could drink enough whiskey to float the *Sue H. Elmore*. Then there was a rush next Saturday to read what R.M. had to say about *that*. R.M. said he would discuss it before the august tribunal of law—which was the circuit court.

R.M.'s suit against Baker went to the jury in due course, and the jury decided that it really wasn't true that R.M. could drink that much whiskey. The jury awarded R.M. one dollar in damages. Ever after, R.M. could say that if the *Headlight's* readers wanted the facts about its editor's capacity for telling the truth, all they had to do was go to the county clerk's office and read what an august tribunal of law had said about it.

Well, to get back to that automobile . . . Tillamook was an all-wooden town: houses, stores and sawmill, where a steel buzz saw was run by the steam from an iron furnace which fed on sawdust. Even the water pipes were wooden. They provided power for the presses, the only other machinery besides the sawmill. No one seemed aware of any such thing as a gasoline engine.

Then, in the spring of 1905, the *Sue H. Elmore* brought in a knocked-down

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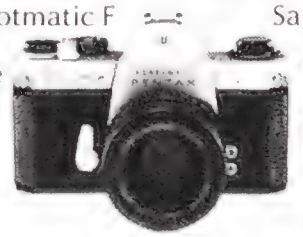

Honeywell Pentax

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People gathered at the post office
to hear what Fred had to say about R.M.

Then there was a rush next Saturday
to read what R.M. had to say about Fred.

automobile, an Orient Buckboard made by the Waltham Manufacturing Company in Waltham, Massachusetts. Body, natural wood; gasoline capacity, three gallons; horsepower, four; cylinders, one; top and sides, none. It cost $375 and was tiny compared to some of the monsters even then humping along the tamped-down dirt roads on the outside—automobiles made by Mors, Napier, Haynes, Locomobile. For $5,000 you could get a Darracq Double Phaeton Tulip. Biggest sellers were the Wintons—the Quad and the two-cylinder touring car. There were then about 43 makes of automobiles.

When the Orient Buckboard was unloaded, I was one of the onlookers because I was printer's devil for the *Herald*. There were many remarks in the crowd as the contraption was assembled. How would it perform on rocky dirt roads? What would it do to children? To dogs and cats? To horses and cows? What would *they* do to *it*?

One of the critics was "Judge" Cooper. I heard him say, "Too bad—Rollie will never know how to manage his money." I knew that was a spiteful remark because Rollie had been criticizing the water company, which Judge Cooper headed. Rollie had said that if the water company had done its job properly it would have prevented the wooden courthouse from burning to the ground.

Rollie then complained that Judge Cooper was getting back at him by keeping pressure low on the *Herald's* press days so there wasn't enough power to run

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the two-revolution Cottrell press, the most advanced piece of machinery in town after the sawmill. I don't know if Judge Cooper did keep the pressure low, but I know that on press days I had to push the cylinder that carried blank sheets of paper back and forth over the type bed—a job that Judge Cooper's water power should have done.

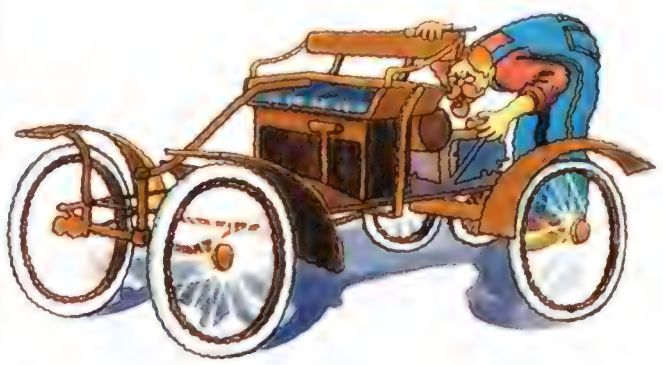
Anyway, putting the Buckboard's pieces together was like doing a jigsaw puzzle. It had a tiller to steer by. It had solid rubber tires. The seat was mounted on a flat platform of polished slats. The engine was under the platform in the rear. I seem to remember that the men kept after that engine for a couple of days, trying to make it work. It had frequent fits of sputtering, and the onlookers would shout "Thar she goes!" and then it would die, and hopes with it. At last some inspired onlooker counseled, "Get Hank Crenshaw."

Hank was the town electrician. He had charge of the town system and of the dynamo at the sawmill which provided power for lighting from sundown to sunup. The sawmill blew its whistle to signal lights on and off all over town.

Hank responded to the pleas and finally got the thing going. It would be nice to report that the bystanders cheered when the engine caught hold. No such thing. People seemed silently awed.

The automobile was wheeled out onto the street in front of the *Herald,* and Rollie hopped in and invited someone (not Judge Cooper) to share the maiden trip along the three-mile road to the cemetery, and then back again. Then other favored citizens had their turns, I, finally, among them.

For quite a while after that Rollie's car was a familiar sight, competing for attention with familiar rubber-tired buggies such as the ones owned by Doc



Hank Crenshaw, the town electrician, finally got the contraption going.

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Sharp the dentist and the ice cream parlor man, who ran ads in the papers announcing "I scream."

The automobile sparked a movement to improve our roads. The riverbeds had plenty of gravel, so the county court summoned citizens to meet and arrange to use the gravel and get the roads rolled by steamroller.

One summer afternoon, I think in the same year, 1905, word spread through town that two men had driven another automobile through the mountains from the outside. They had come right through the Grand Ronde Indian Reservation and along the Nestucca and Trask rivers. When folks gathered to hear them tell about it I was there, too, for I was also a fledgling reporter. I talked to them and took notes. They told me of the marvelous speeds they had made—20 or even 30 miles an hour, in places.

In 1908 Rollie Watson bowed out of journalism to inaugurate a new enterprise, an automobile stage route from McMinnville, on the outside, to Tillamook. Fare, $10. The Orient Buckboard had emitted its last sputter, and Rollie had acquired an impressive affair with enclosed sides and front and back seats. I was one of the first passengers, and I wrote a feature story for the *Portland Oregonian* about Rollie's new stage run.

The automobile had by now become a

Nowadays a bus brings one in from the outside on paved roads.

competitor with the *Sue H. Elmore* and with the horse-drawn stagecoach that took a breather at the top of the mountain pass and arrived the morning after it set out. I described the country through which we passed in Rollie's automobile, and the people along the way who watched this advance in transportation with deep interest. Reading my feature, later, some of the townsfolk thought I laid it on rather thick.

In 1912 a passenger train made its first run into town. It soon put the stagecoaches, both horse-drawn and motorized, and the *Sue H. Elmore* out of business. But it was a great day for Tillamook when a circus train rumbled over the mountains for the first time.

Tillamook changed a bit as the years passed. Rollie, I believe, went into real estate. His uncle, R.M., left town and started a weekly paper over near Astoria, *The Seaside Signal,* which still flourishes. Then he left Seaside and went across the Columbia River into Washington state to start still another paper. He and I exchanged letters for a while, but I finally lost track of him.

Fred C. Baker stayed put. It's my understanding that he died in Tillamook, with his boots on, as they say in the West.

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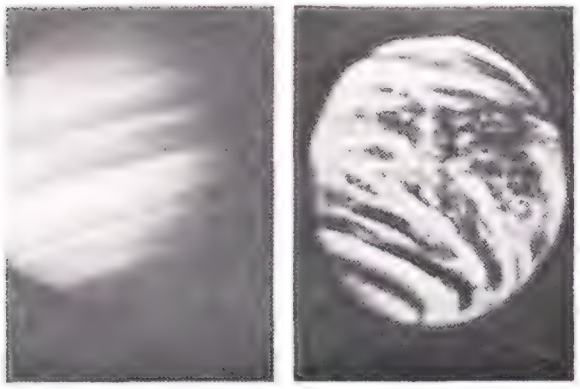

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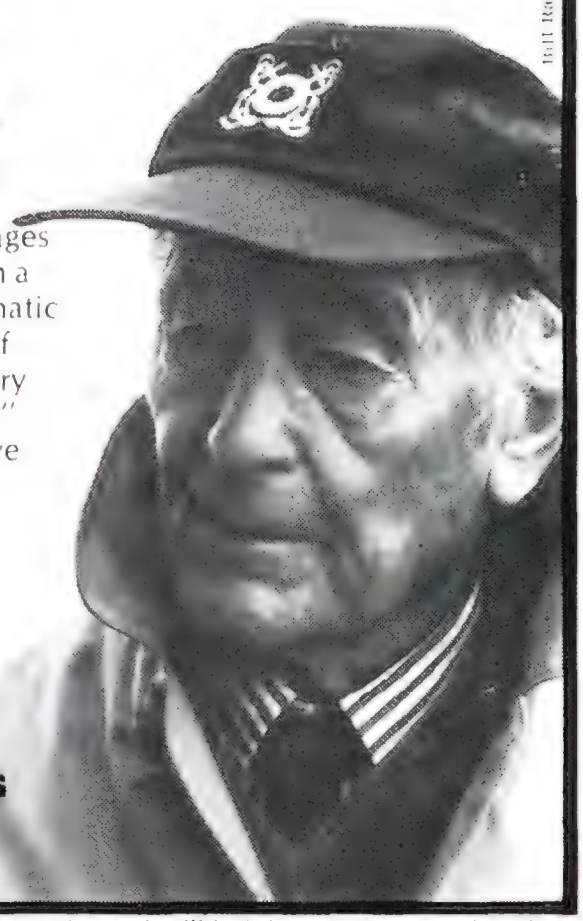

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Book reviews

Supership
Noël Mostert
(Alfred A. Knopf, $8.95)

The lifeblood of our world, as recent events make us painfully aware, is a smelly, sticky, inflammable, poisonous liquid which we hardly ever touch or see. The fact that oil is hidden from us in pipes, pumps, tank ships and refinery columns may make the awesome problems it has spawned seem unreal.

This book illuminates one problem—the hasty, even reckless development of vast fleets of supersized tanker ships. The utility of supertankers is obvious: More than a billion tons of crude oil must be gotten across oceans every year. But the author, a lover of ships and the sea, paints a frightening picture of the manner in which greedy men produce profits.

The sheer size of the supertankers, "their dimensions being one of the technological audacities of the century," is almost beyond imagining. Longer, wider, deeper than the Cunard Queens, too massive to be stopped by any anchor, too monstrous to enter most of the world's ports, the 214,000-ton *Ardshiel,* which Mostert rode to the Persian Gulf, has nearly a dozen times the capacity of the largest tankers at the end of World War II. Yet she is less than half as huge as the largest now in use. Even million-tonners are coming. The tankers, Mostert says, grew much too quickly, without benefit of commensurate knowledge of the forces created by their enormous hulls. They are increasingly controlled by automation, whose "pretty, animated face" appears deceptively foolproof, but which is utterly dependent upon the ship's own power

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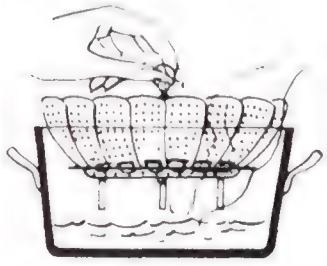

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supply. Penny-pinching has left many of these costly giants without backup equipment for a power system that, if it fails, can leave the monster to drift helplessly with as much thermal energy lying passively in its belly as is contained in an H-bomb.

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It is not the peril that ocean poses to ship and sailor which most worries Mostert, but the other way round. Tank-washing and wreckage inject millions of tons of oil into salt water each year. The book recounts what is known of this threat to the fragile web of life from such disasters as the breakup of the *Torrey Canyon* off Cornwall. It decries the danger to jackass penguins, fish and plankton "pastures" native to the food-rich southern ocean at a time when humanity is approaching a protein crisis.

For the first time in history, a class of ship threatens the ocean's life. "The world's seas cannot be expected to survive the oil ships if they continue to be built to and operated and sailed by the sort of standards that largely prevail," says Mostert. "The oil is running out . . . and always was. The seas were infinite, and should have remained so. We'll find something else instead of oil to light our lamps and turn our too-many wheels. The seas we shan't replace."

—*Warren R. Young*

Free-lance writer, author of oil spillage article in SMITHSONIAN (November 1970).

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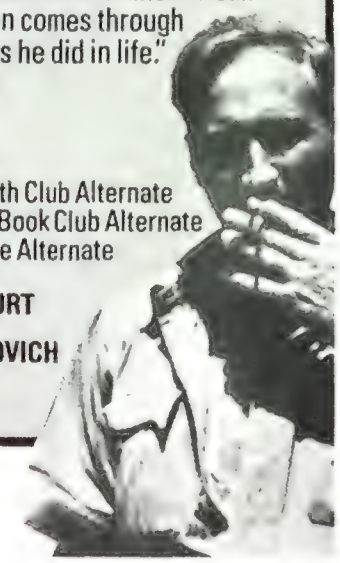

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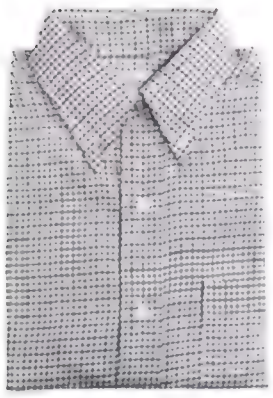

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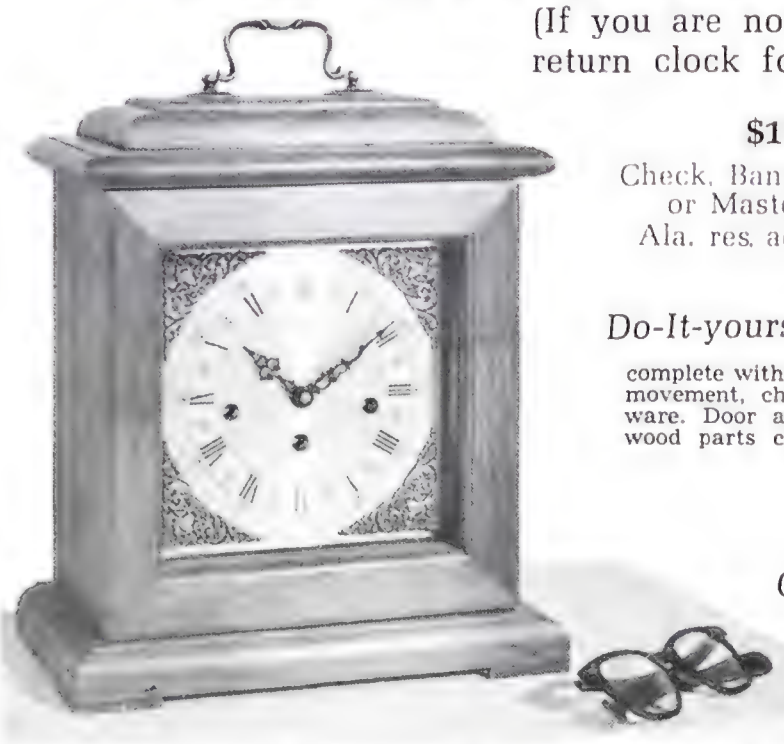

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Mayflower replica under sail

Plymouth, particularly in the early years, was a community of very diverse people. Those who were there for religious reasons probably never constituted a majority; economic motivation for re-

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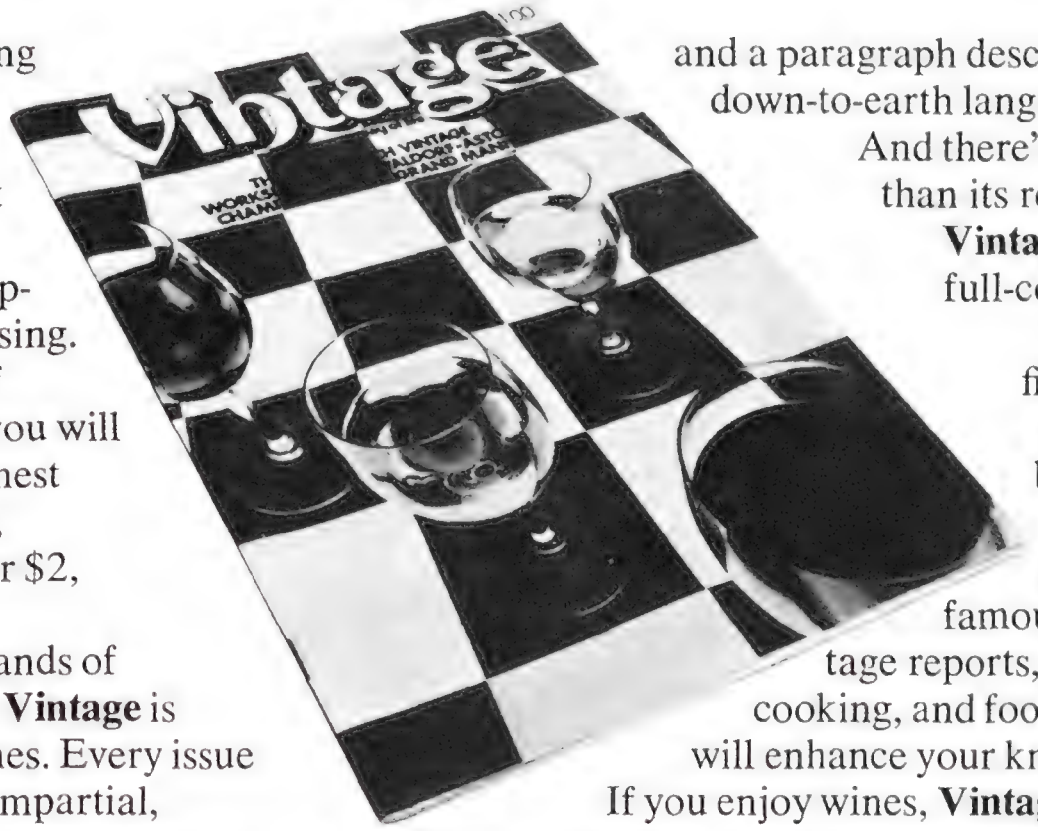

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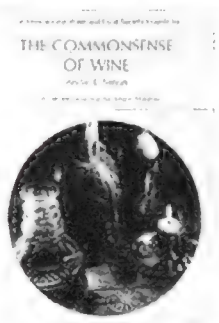

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moval to the New World was at least equally as important as the search for religious freedom. It is difficult to determine the sense in which the term "Pilgrim" is used throughout the book, except to note that at times it seems to refer only to the Separatists of the Colony and at others to every person dwelling there at the time. The term "Pilgrim" is difficult to define, and so infused with stereotypical imagery that it is perhaps best avoided when matters of specific information are involved. As the text stands, the general impression given is that of a group of Colonists, most of whom were motivated out of religious concern, living with a few others who had come to America for more personal and practical reasons. This lack of balance is unfortunate, because it tends to give short shrift to the more material reasons for removal to the New World that were probably shared to some degree by even the most devout Separatists.

There are some factual errors as well. Potatoes were not being cultivated in New England when the Colonists arrived; matchlock muskets do not use flint and steel for powder ignition; there is no evidence for any livestock on *Mayflower*, much less for where it was located; nor do we have any idea of what furnishings were carried on that first voyage. References to the use of logs in constructing the earliest houses in the Colony have been refuted.

Caffrey's volume is a readable and interesting narrative, to be approached with the reservations raised above.

—James Deetz
Professor of Anthropology, Brown University, and expert on Colonial period

Innocents at Home
Tad Szulc
(Viking, $10)

Change is the quality of life that drives America forward, Tad Szulc (pronounced Schultz) tells us in *Innocents at Home*. For America in the 1970s, change means confrontations, and, Szulc argues, "confrontations among us are as inescapable as they are necessary."

After five years abroad as a foreign correspondent for the *New York Times*, Szulc returned to Washington in 1970 with his wife and two children to rediscover America. He spent three years traveling and examining the American condition.

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WINE TALK

by Austin, Nichols

M. de Rausan thought so highly of this wine that he dumped it in the Thames.

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Of Rausan, the wine expert Benjamin Franklin once said, "This wine I import for myself." And of Rausan-Segla, the experts at Austin, Nichols say, "This wine we import for you."

Szulc saw California luxury condominiums, burned-out inner cities, the "military towns" of Colorado Springs and Virginia Beach, and the instant utopias of Columbia, Maryland, and Reston, Virginia. American poverty shocked him. "The hamlets I saw from Arkansas to Tennessee and North Carolina could not possibly belong to the same culture and civilization as the rest of the nation," writes Szulc.

Szulc tries to offer more than a mere catalog of the American condition, but often he spreads himself too thin, as when he describes the woes of job dissatisfaction without attempting an in-depth answer. He touches on developing class consciousness among workers but leaves the problem hanging. He is best at telling us what ails America, not at how to cure it.

Szulc has mastered the 1970 U.S. Census data plus government studies on work, fair housing, juvenile justice and national nutrition needs. The rich, he concludes, are getting richer and the poor more numerous. America in the 1970s is spending $25 billion a year on advertising while 15 million people are on welfare and 30 million people depend on Social Security. Such contradictions trouble Szulc and his liberal conscience. He sees the solution in that elusive, mercurial quality of American life called Change.

Szulc's personal concern and compassion suffuse his book and soften the harsh statistics he enumerates. Always the concerned journalist, Szulc has no comprehensive or ideological answers. He argues that describing conditions and accepting confrontation as part of the process of change is enough to get us through. The new American left, he says, is essentially a non-ideological political movement whose diversity reflects America's unique ability to adjust to and encompass new conditions. Szulc's optimism is comforting but, matched against the weight of his evidence, unconvincing.

—Jerrold L. Schecter
Diplomatic editor of *Time,* correspondent in Hong Kong, Tokyo and Moscow

God or Beast
Robert Claiborne
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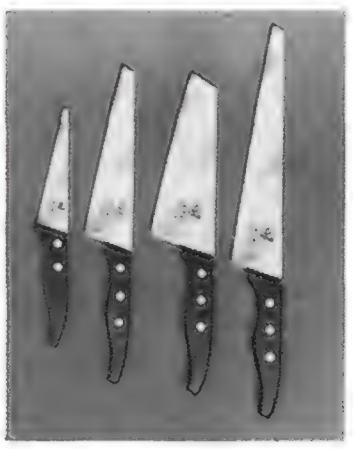

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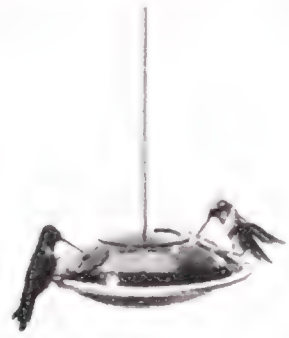

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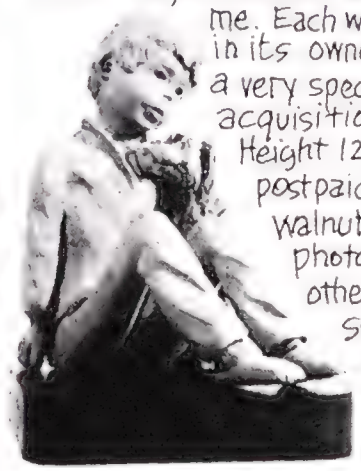

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inevitable progress from violence and aggression toward the ideals of humanism. The 20th century has dampened such optimism under colossal evidences of man's inhumanity to man, augmented daily in the news media.

To increase the gloom, a number of scientists delving into man's prehistoric past have been serving up for popular consumption their often controversial conclusions that the urge to bully, maim and kill his fellows has always been a dominant feature of human nature, and so probably always will be. Notable among them are Konrad Lorenz, Robert Ardrey, Desmond Morris, Lionel Tiger and Robin Fox.

In this book Robert Claiborne defends the view that altruism has deeper, stronger roots in the human psyche than aggression. "One could, indeed," writes Claiborne, "argue that if (as Ardrey has alleged) man possesses an 'instinct to kill' because he occasionally kills his fellows, he must possess a far more powerful 'instinct to share' because he typically shares with his fellows."

Claiborne's most effective weapon is a style that should win for *God or Beast* a wider readership than the pessimists enjoy. For example, after surveying a broad spectrum of anthropological research, he sums up: "We . . . routinely respond to and satisfy the needs of others —sometimes, indeed, in the hope of some tangible reward, sometimes in fear of what people will say if we don't, but often because satisfying the needs of others, and thereby sharing their satisfaction, is intrinsically rewarding. Humans, by evolutionary necessity, have acquired altruistic impulses adding up to the principle that it is at least as blessed to give as to receive."

It's too bad that, in his headlong tilts with the pessimists, Claiborne uses some lances that readers will be strongly tempted to turn back on his own book. Not a scientist himself, Claiborne doesn't hesitate to put forth his own ideas for serious consideration. This becomes somewhat hard to take when, for example, he dismisses as "fantasy" a theory of Sir Alister Hardy on the grounds that, although a scientist, Hardy was, after all, merely a marine biologist, not an anthropologist or paleontologist.

Never mind. We can be grateful for this very readable and, for the most part, careful review of the considerable body

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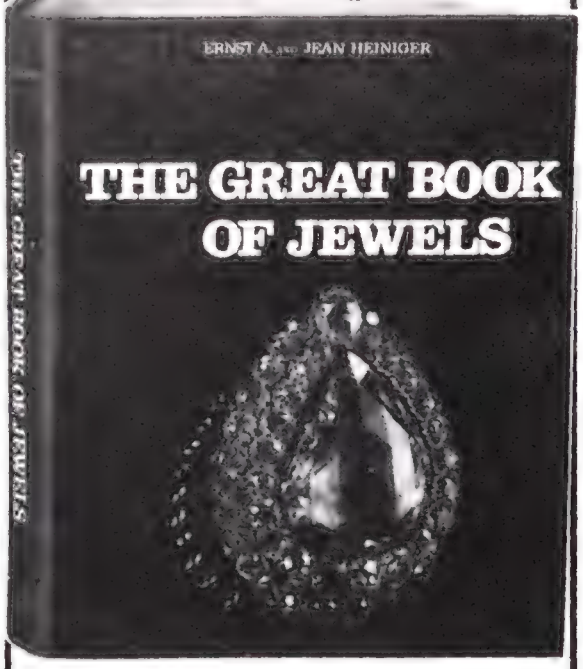

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—*Pat Tucker*
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The Last of the Nuba
Leni Riefenstahl
(Harper & Row, $18.95)

The Last of the Nuba is a sensitive photographic presentation of a people who have managed, through cultural pride and a bold defiance of Western cultural pressures, to maintain their historic lifestyle in central Sudan. The author, who was Hitler's favorite film maker and thus became the subject of controversy recently when she was given an award at a film festival in Telluride, Colorado, has captured through the medium of still photography the culture of the Mesakin Nuba.

Leni Riefenstahl's descriptions of Nuba eating habits, sexual customs, legal system and reverence for elders emphasize their moral principles. She tells of the crucial nature of building a home as required by marital custom: A married woman lives with her parents until the husband builds a house for her.

Of special interest is the skillful handling of thorns and other sharp objects which the Nuba use on their bodies to effect ornamental cicatrization. A girl's body is decorated at puberty, and a new design is added at each pregnancy. Cicatrices on the men symbolize courage.

The Nuba are agrarian people. Using the simplest form of farm tools, they labor with few interruptions from six A.M. to four P.M. in temperatures ranging from 88 to 104 degrees. Although the main cultivated crop is sorghum, small but specialized plantings of such luxury items as peanuts, beans, sesame, cotton and tobacco are also made. Generally, the Nuba manage to squander all their harvest in a relatively short time, only to begin starving during difficult times.

The greatest challenge to a young Nuba boy comes when he is admitted to the *zariba*, where teen-agers are given strict training in herdsmanship and wrestling. One requirement is total abstinence from sexual intercourse, and, in order to demonstrate their purity, the

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This excellent book is readable and beautifully illustrated and it carries an important, albeit distressing, message—the culture of the Nuba is vanishing.

—Edward S. Ayensu
Chairman, Department of Botany,
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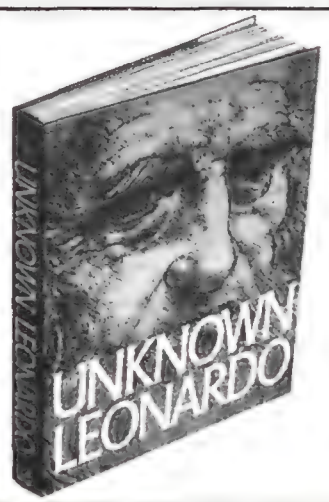

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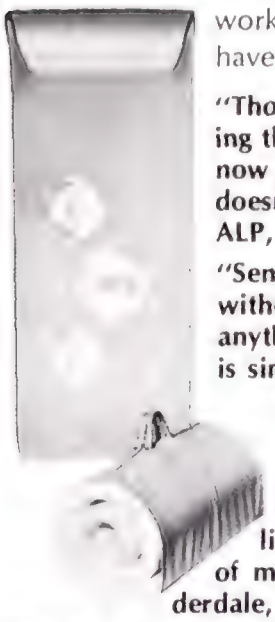

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Divisions of Performing Arts and Musical Instruments

"Music from Marlboro" features selections from Mozart, Dvorak and Brahms—November 2, 5:30 P.M., Baird Auditorium, Museum of Natural History.

"Musical Instruments" series presents the Michel Piquet Baroque and Renaissance Recorders on antique instruments from the museum collection—November 2, 8:30 P.M., Hall of Musical Instruments, Museum of History and Technology.

"Theater Chamber Players at the Smithsonian" presents the first of five Monday evening programs—November 4, 8:30 P.M., Baird Auditorium, Museum of Natural History.

Roy Eldridge, a leading trumpet player, appears in the "Jazz Heritage" series—November 10, 4:30 P.M. workshop, 8 P.M. concert—Baird Auditorium, Museum of Natural History.

"Musical Instruments" features works of Boccherini and Mozart—November 11, 8:30 P.M., Hall of Musical Instruments, Museum of History and Technology.

Heen Baba and his Dance and Drum Ensemble from Ceylon are guests in the "Man and His Culture" series—November 17, 8 P.M., Baird Auditorium, Museum of Natural History.

"Musical Instruments" presents a concert of works by Charles Ives and Arnold Schoenberg in honor of the composers' 100th anniversaries—November 24, 8:30 P.M., Hall of Musical Instruments, Museum of History and Technology.

For tickets and information about discounts for Resident Associates, senior citizens and students, call (202) 381-5395.

Smithsonian Commons

Located in the original Smithsonian Castle building, the Commons offers a new luncheon menu with individual service for a fixed price of $3.25. Hours are 11:30 A.M. to 2 P.M. Monday through Friday. An Associates card is required. In the spring of 1976, the Associates look forward to opening a new facility in the Museum of Natural History which will accommodate the increasing numbers of Smithsonian Associates.

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Travel Benefits for Smithsonian Associates

Ever since the beginning of the Smithsonian Associates, it has been the goal of the Smithsonian to establish a travel program meeting the needs of its membership. At first, a superb Foreign Study program under the direction of Dr. Richard Howland was available to Associates. In 1968, Domestic Study tours, strategically spotted across the country, were created.

Now, a new travel benefit, Foreign Charter tours, has been added (see p. 31, October SMITHSONIAN). This means there is a tour for every season, a tour for every taste and a tour for every purse. All the tours are Smithsonian-sponsored, whether they be Foreign and Domestic Study tours (small-group, specialized, intensive) or Foreign Charter tours (larger-group, lower-cost).

DOMESTIC STUDY

Christmas at the Smithsonian—December 6-8: An old-fashioned tree-trimming party in the Castle; behind-the-scenes look at the Exhibits Production Section; a visit to U.S. Botanical Garden's spectacular poinsettia display; a tour of the newly opened Hirshhorn ● **Winter Weekend in Sturbridge Village**—January 17-19: The atmosphere of old New England; meetings with local curators and historians; sleigh rides in the snow ● **Baja Whale Watch**—February 6-15: From San Diego to San Benito Island, San Ignacio Lagoon, Cedros and San Martin Islands on a 95-foot sport-fishing boat ● **Yellowstone Winter**—February 15-21: Photographic survey by snowmobile coach of still life and unusual winter lights in Jackson Hole, Lake Yellowstone, Fountain Paint Pots and Bear Canyon; accommodations at Old Faithful Snow Lodge ● Spring tours include **All About Gems** weekend at the Smithsonian, a week at the **Georgia Indian Mounds** and a camping trip in **Death Valley.** Write **Mrs. Rosa Mae Howe, Domestic Study Tours, SI 106,** Smithsonian Institution, Washington, D.C. 20560.

FOREIGN STUDY

Egypt and Ethiopia—January 4-26: Antiquities and sites (waiting list only) ● **Ancient Sites of the Maya**—January 11-30: *Argonaut* yacht cruise from Montego Bay to British Honduras, Guatemala and Yucatán. Optional return by air via Mexico City ● **The African Quest**—February 14-March 25: Fly to Tanzania and board the *MTS Apollo* at Dar es Salaam; circumnavigate Africa to Dakar calling enroute at fabulous ports of call; cruise up the Congo River. ● **Australia and New Zealand**—March 14-April 8: Flora, fauna and anthropology, via Tahiti and Fiji ● **Northern Spain and Southern France**—May 13-June 4: Cave paintings and the art of Paleolithic man ● **Classical Greece**—June 10-July 2: Archaeological sites in central Greece and the Peloponnesus ● **Copenhagen to Lisbon**—August 23-September 14: *Argonaut* cruise with stops at major European ports ● **Russia**—September 20-October 4: Art and architecture ● **Hawaiian Islands**—November 8-21: Petroglyphs and natural history ● Write **Miss Bliss Schumann, Foreign Study Tours, SI 123,** Smithsonian Institution, Washington, D.C. 20560.

FOREIGN CHARTER

Great Britain—May 1-15 or September 25-October 9: The National Gallery, Tate, Victoria and Albert; walking tours of literary London and excursions in the countryside ● **Russia**—May 8-22, May 21-June 4, October 2-16 or October 16-30: The Bolshoi Ballet, Moscow Circus, Hermitage; schools, factories and hospitals in Moscow, Leningrad and Riga ● Write **Robert Angle, 1000 Jefferson Drive,** Smithsonian Institution, Washington, D.C. 20560.

National Collection of Fine Arts

"Made in Chicago" features paintings and sculptures by 11 contemporary Chicago artists. The show, which opened at the Twelfth São Paulo Bienal in Brazil, is characterized by fanciful and eccentric images combined with disquieting or boisterous humor. The work of H.C. Westermann is also included—opens October 31.

Hirshhorn Museum and Sculpture Garden

The Smithsonian's newest museum is now open to the public. The Hirshhorn collection includes 6,000 modern paintings and sculptures, 900 of which are displayed in historical sequence at the first exhibition. Internationally renowned works by Rodin, Henry Moore, Picasso, Calder, Matisse and Giacometti are among the acquisitions. Entrances are located at Independence Avenue and Jefferson Drive, S.W. In December, a new jazz concert series will begin in the Hirshhorn Museum.

Air and Space Museum, Arts and Industries Building

"Life in the Universe?" is a major new exhibit exploring the possibilities of extraterrestrial life. The exhibit, a mixture of fact and speculation, features artist's conceptions of weird flying creatures and swimming carnivores (see October SMITHSONIAN), and discusses the origins of life on Earth, as well as on other planets. Black lights add an eerie element of science fiction to most of the displays.

Puppet Theater, Arts and Industries Building

"The Book of Three" is an adventurous tale based on a book by Lloyd Alexander. It is a story of evil and good, a fantasy rooted in reality and truth—for ticket information, performance times and group reservations, call (202) 381-5395. Children under three excluded.

Parking on the Mall

Metro construction has made parking on the Mall near the Smithsonian complex extremely difficult. All parking prior to 10 A.M. is restricted. The use of public transportation is recommended. Write Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560, regarding fringe parking locations and public transportation.

Traveling Exhibition Service
There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- University Park, Pennsylvania—"The Black Presence in the Era of the American Revolution" (Pennsylvania State University, November 2-December 1).
- Abilene, Texas—"A Children's World (III)" (Fine Arts Museum, November 2-December 1).
- Nashville, Tennessee—"Chinese Export Porcelain" (Tennessee Fine Arts Center, November 23-December 29).
- Halifax, Nova Scotia—"Folk Baroque in Mexico" (School of Architecture, Nova Scotia Technical College, November 16-December 15).
- New York, New York—"Kurt Kranz: Bauhaus and Today" (New York Cultural Center, November 9-December 15).
- El Paso, Texas—"German Posters of Today" (El Paso Museum of Art, November 9-December 8).

Contributing Memberships
Persons who contribute $50 or more annually to the Associates support the Institution's national educational programs and enjoy additional privileges. Graduated benefits include:

- Assistance in communicating with any part of the Smithsonian.
- Information on any museum in the world in advance of a visit there.
- Smithsonian annual report and other publications.
- Invitations (when in Washington) to exhibition previews and special events, including admission of a guest.
- Research service for questions about subjects related to the Smithsonian.
- A remembrance from the Smithsonian in the form of a commemorative object or work of art. Write: Contributing Membership, Smithsonian Associates, Smithsonian Institution, SI 118, Washington, D.C. 20560.

Fall Museum Hours
The Smithsonian museum buildings are open daily from 10 A.M. to 5:30 P.M. Hours for the National Zoological Park are 9 A.M. to 4:30 P.M. daily.

EVEN ON A LYNCHBURG FOX HUNT,
the talk will generally take a turn toward whiskey.

Mainly, we'll sit round the fire, let the dogs do the work and tell stories about the good old days. We'll recall when Jack Daniel bested all the big distillers at the St. Louis World's Fair. Or the time Tennessee voted dry in 1909. And the day Mr. Jack nearly got married. It seems that the stories could go on and on. But then the dogs get to baying in a special way and someone says, "Boys, let's chase ourselves a fox."

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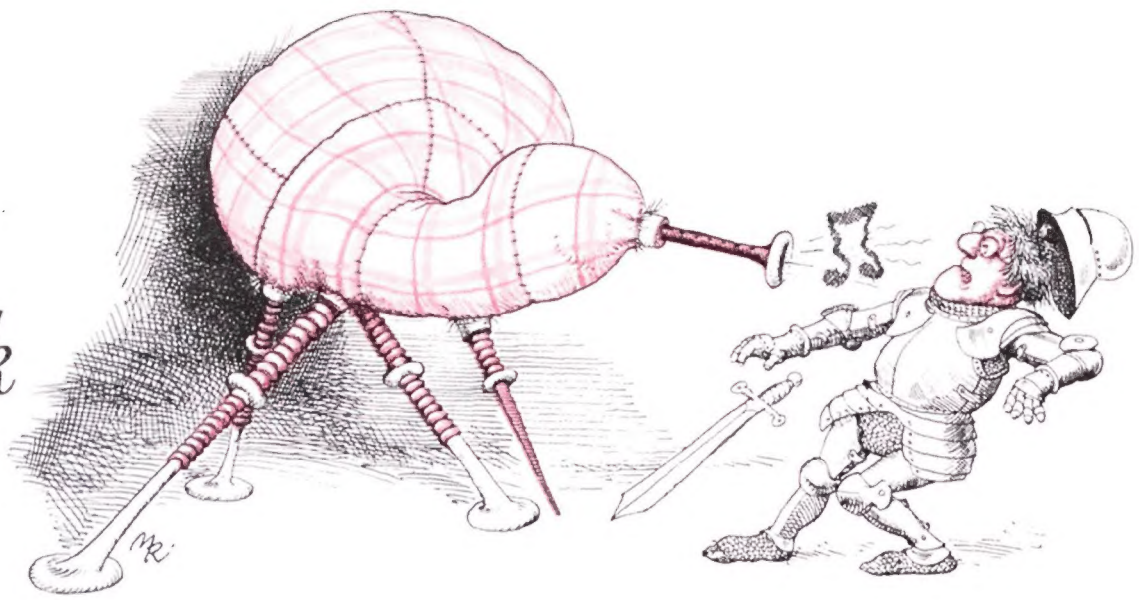
By H. Allen Smith

It must be war on a Dudelsack with the hi-fi



Long ago when the Lower Cambrian fossils were young and lively, I, Smith of Illinois, arrived at a judgment concerning the most hideous noise ever contrived by the human race. It was not the yelping of a female yodeler, nor yet the screech of chalk against a blackboard. It was the sound of a bagpipe.

We had there in Illinois a neighbor who laid claim to Scottish blood strains and who had a Highland bagpipe. He played only one selection on it, a tender folk ballad titled *The Sow Got the Measles and Died in the Spring.* He played it every day of his life; worse, he sang along with it. We tried to get him arrested and, failing that, formed up a conspiracy to kill him. He got wind of this and fled to the town of Mattoon. Even today I slit his throat in my dreams.

Let it be understood, the prejudice is not against the Scots. They did not invent the bagpipe. That crime was probably perpetrated in the Near East. There is evidence that the first of these instruments, once known as The Cow's Complaint, appeared on Earth in the Sumerian Plain and spread westward to Turkey and Greece and then all of Europe. History first mentions the bagpipe as playing for the Roman legions, and some historians suggest that Nero played it—not the fiddle—while Rome burned.

As a lay musicologist I have a theory that the bagpipe scourge started in China and was brought home to Italy by Marco Polo, who also may have brought back spaghetti flour, which was used for thousands of years in Asia. In Italy to this day the bagpipe is called a *cornamusa,* as it should be. In Germany it is a *Dudelsack* and the man who plays upon it is a *Dudelsackpfeifer.* That is a fine title, but I still think he should be fed from a bowl outside the kitchen door.

My musician friend Will Fowler, asked to name the most important feature of the bagpipe, responded: "It is the only instrument that can get out of tune in four different directions at the same time."

He had in mind that gaggle of pipes appended to the greased leathern bag. Pipers call the blowpipe the insufflation tube; they sufflate air through it to an underarm reservoir bag which is kept under a squeezing pressure. There is a big tube called a chanter, which is the melody pipe, as rueful a misnomer as was ever bestowed. The chanter has six or seven holes so that the piper can render those compositions said to be most suited to bagpipe treatment, such as reels, laments, barcaroles, pibrochs, strathspeys, and country and western. All of these sound, to my ear, like *The Sow Got the Measles and Died in the Spring.*

Among the Scots and the Irish the bagpipe has long been a military weapon, employed against heavily armored English men-at-arms in the same way that the Confederates used the rebel yell presumably to paralyze the Yankees. And there is the lore that at Kimlochmoidart (either a town or a Grampian hiring-hall for shepherds) there is preserved a bagpipe which was played at the battle of Bannockburn. Caledonian poppycock. The bonny lads under Robert the Bruce insufflated into no bags that famous day—they drove off the English by beating on haggis pots and howling verses writ by Thomas of Erceldoune. They wore no kilt, either. As a matter of fact they were apt to attack with nothing on at all below the waist.

Why this sudden concern over bagpipes in the Era of the Amplified Guitar? Just recently I witnessed a telecast from a town in upstate New York where some people have established a school for teaching the bagpipe. The man said they couldn't begin to cope with the pile of applications coming in. He said the electronic *Dudelsack* might be upon us soon.

I take oath. If those Nashville folks discard their git-fiddles and embrace the hi-fi *Dudelsack,* I shall study the Inquisition techniques of Torquemada. If my war on the *Dudelsack* should fail, I intend to contract the measles and die in the spring.

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